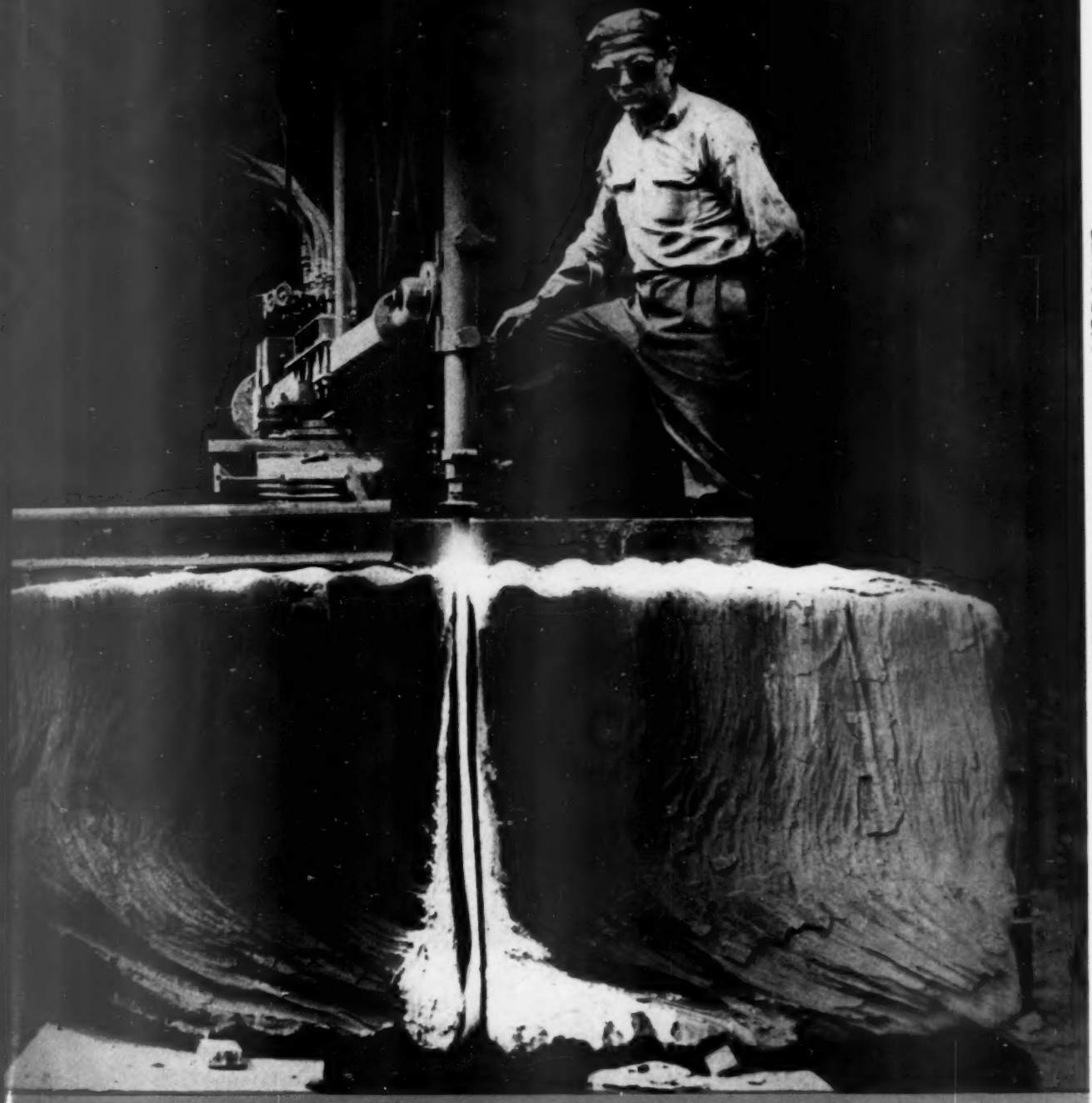
THE WELDING ENGINEER

JULY, 1949



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Volume 34 - Number 7 July, 1949

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THE WELDING ENGINEER

JULY, 1949

Liberty Is Not a Gift

God grants liberty only to those who love it, and are always ready to guard and defend it.—DANIEL WEBSTER.

IF WE ARE to believe the words of Daniel Webster, only 52% of the people in this country have the right to enjoy the privilege of living in the greatest nation on earth. This is the 52% who demonstrated that they appreciated their responsibilities by going to the polls and voting in the last presidential election.

Many of those who take no part in guarding the liberties of our republic by going to the polls are the first to criticize when things in Washington don't go to suit them. These irresponsible citizens seem to be the last to recognize that if *they* would take the time to vote, the political situation might be more to their liking. Let them look back to a July of 173 years ago!

A small group of our forefathers—small-town merchants, country lawyers, farmers and perhaps a banker or two—decided that liberty was a precious heritage—a heritage worth fighting to win. They proclaimed that the thirteen North American colonies should be the "land of the free." Struggling against tremendous odds, they made their Declaration a fact; they wrote a Constitution different from any the world had ever seen, and they established a Bill of Rights granting all of us the rights to life, liberty and the pursuit of happiness.

The wisdom of the founders of this nation has often been questioned, but in the acid test of time it has never once been found wanting. Never in all history has a nation experienced the steady, lasting growth found in these United States. Never have so many enjoyed so much in the way of material advantages. More powerful nations have waxed and waned while our nation with its constitutional provisions for liberty has grown ever stronger and stronger.

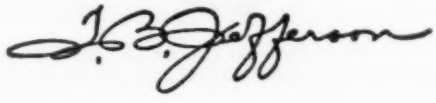
Since there are all sorts of us in the United States today, there are even some who feel that the masses enjoy too much liberty. They would eliminate some of our freedoms: freedom of speech, freedom of choice, freedom of religion, freedom to work where and when we please, freedom to buy and own property, freedom of enterprise. But if you knock out any one of them, you will make it so much easier to eliminate the rest.

Liberty is not a gift from on high: it is earned by our own endeavors and destroyed, much more easily, by our neglect. The enslavers are always with us; whether they succeed or not depends upon our vigilance. That vigilance, as was once pointed out, must be eternal.

Regardless of what those who would destroy our liberties may say, freedom of enterprise—freedom of opportunity plus the freedom to compete—has made it possible for a nation with only 6% of the world's land area and 7% of the world's population to enjoy the world's highest living standards and still be able to spend billions of dollars to improve the standards of living of other nations.

Those precious liberties that 48% of us are so carelessly neglecting make it possible for each of us to seek the job affording the greatest pleasure and the best pay. They allow us to call the doctor we want. They enable the development of individual strength and character, which is imparted to our nation to make it strong.

As we again celebrate the birth of liberty in our nation, let us remember that now, more than ever before, we must continue to guard our heritage. We must guard it both from the obvious dangers outside and from the more insidious and deadlier dangers boring from within. Nothing must ever come to pass in these United States that shall endanger the rights which all true Americans cherish—to life, liberty and the pursuit of happiness. Once these basic rights are gone, we are lost indeed.



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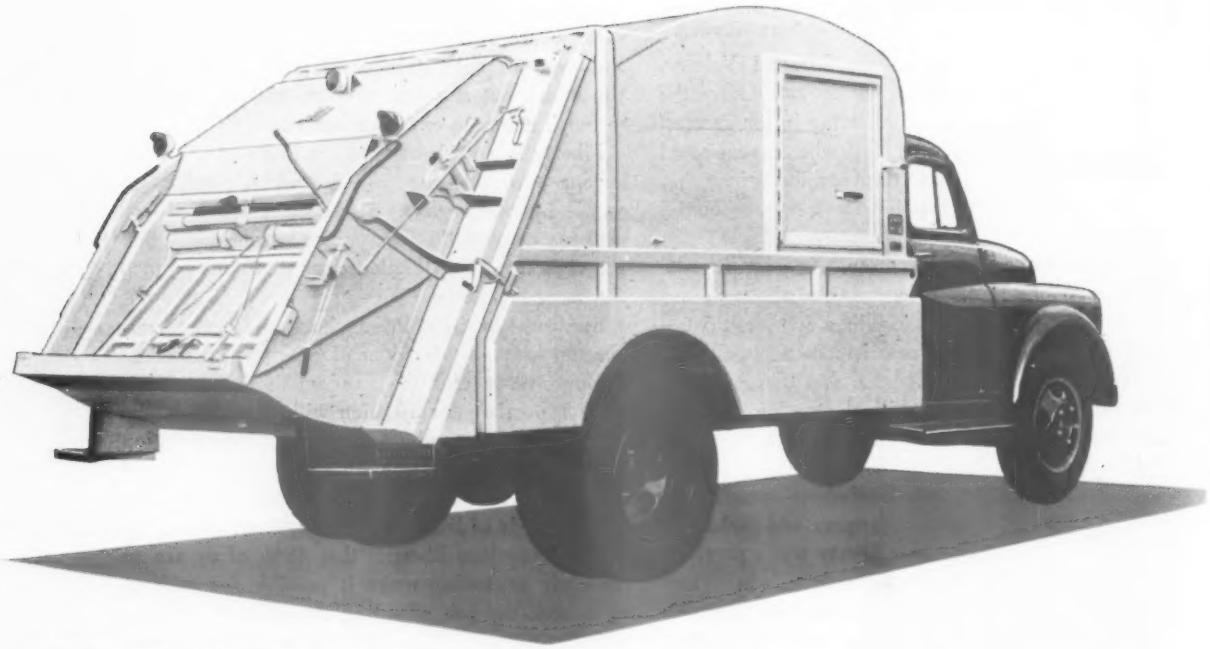
another use for N-A-X HIGH-TENSILE STEEL



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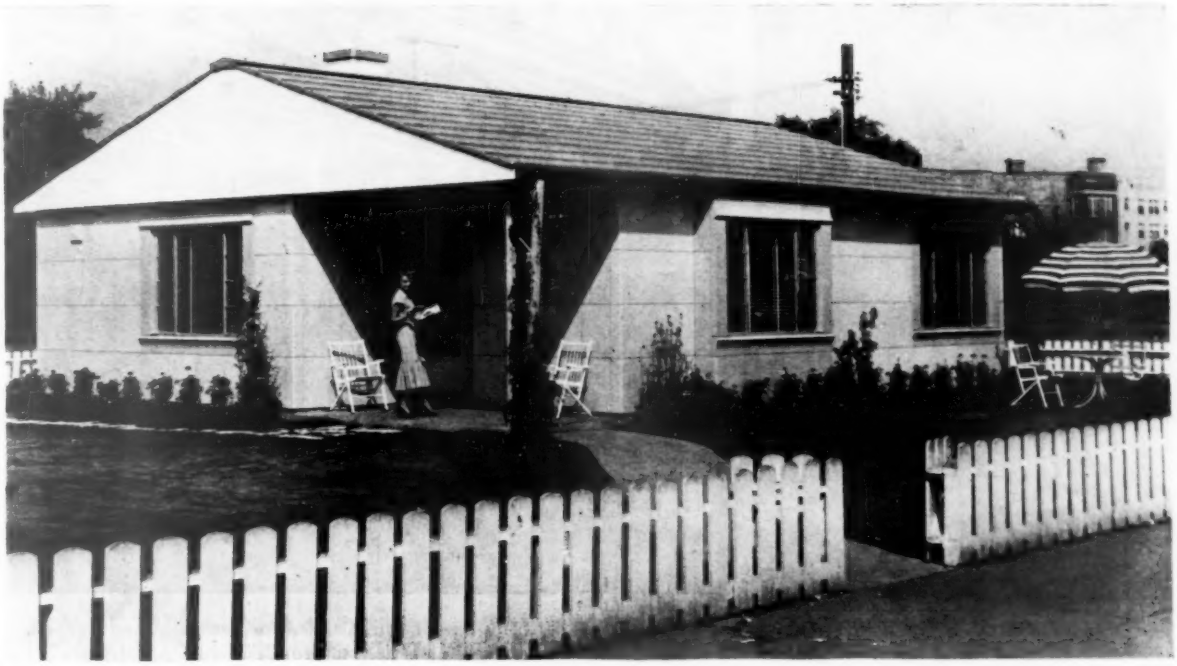


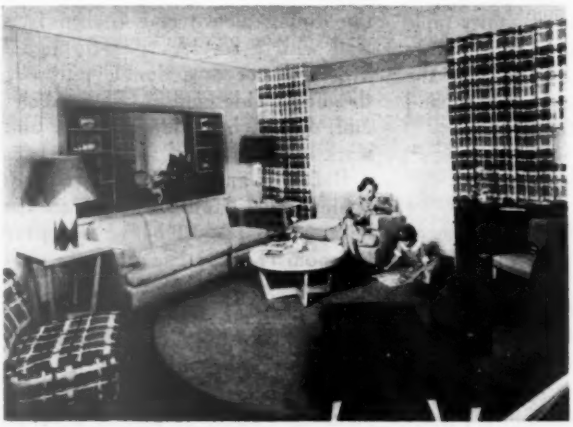
1—LUSTRON HOME at Columbus, O. This model modern home has been inspected by thousands of admiring visitors

LUSTRON'S
Spot-Welded Homes

The new Lustron home has taken our country by storm. Basically, it's a prefabricated framework to which porcelain-steel panels are bolted in the field. Ingenious welding set-ups were designed

BY CLYDE B. CLASON

EVERYONE talks about the housing shortage, but Lustron Corp. is doing something about it. In its huge plant at Columbus, O., the company is tooling up to produce 100 five-room steel houses a day. And what



2—LIVING ROOM is featured by a large picture window and by the combination bookcases and wall recess

3—DRESSING TABLE and large mirror are part of the home. Notice overhead storage and sliding doors

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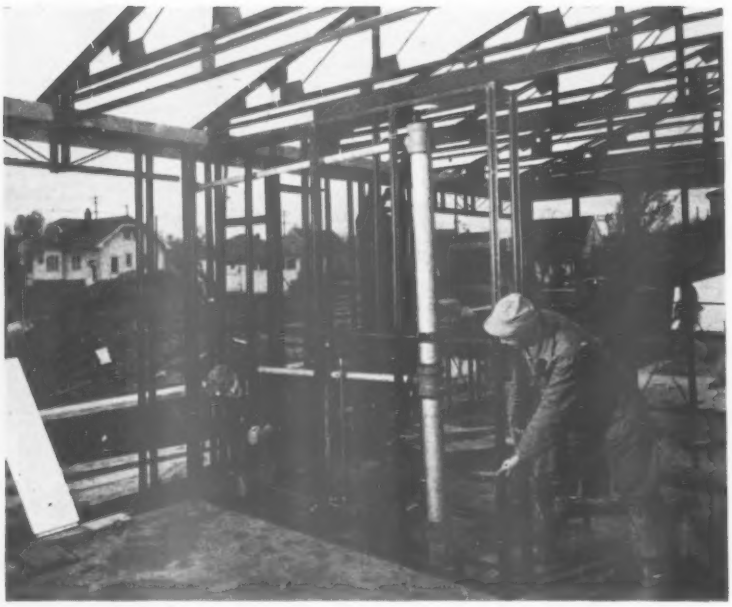
4—WALL SECTION is first bolted to the concrete foundation to erect a home



5—PLUMBING WALL is one of two installed for bathroom and kitchen. Silver-brazed copper piping is used to provide corrosion resistance

houses they are—fireproof, decay-proof, termite-proof, vermin-proof and rat-proof! One of these "homes of tomorrow" is hauled to you in a large trailer that holds everything including the kitchen sink. Your house is erected on the site by a factory-trained crew in less than a week. Nor is the cost prohibitive. In the Columbus area you can buy one for about $9,000 exclusive of the lot; elsewhere prices will naturally be higher because of increased trucking charges.

Plan 45,000 Homes a Year

Though production is being geared to a peak capacity of a hundred homes a day, more than 45,000 luxury homes yearly is the goal of Lustron's president, Carl G. Strandlund, a man who established one of the nation's outstanding production records during World War II. Mr. Strandlund, former vice-president and general manager of the Chicago Vitreous Enamel Product Co., has extended his successful methods to the housing field.

Porcelain enamel on sheet steel is the basic material of the Lustron home (Fig. 1). The outer walls are built up of standard 2 by 2 ft panels, each insulated by 1½ in. of Fiberglas to make a home that is warm in the winter, cool in the summer. A waterproof plastic packing that never needs replacement seals the joints between panels. Interior walls are likewise made of porcelain-enameled panels, and the roof is formed of large enameled-steel tiles which have been pressed to the required shape on one or another of Lustron's 163 presses. Floors are finished with polished asphalt tile in colors chosen to harmonize with the walls.

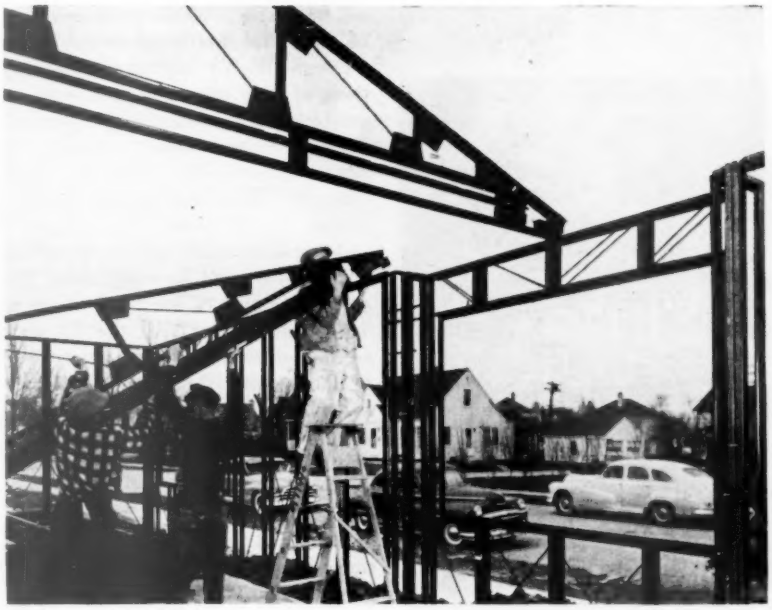
A Lustron home never needs painting, either inside or out. If the outside gets dirty, wash it off with a hose the way you do your car. The inside walls can be kept beautifully clean with a damp cloth. Standard equipment includes a combination dish-clothes washer, floor-to-ceiling kitchen cabinets, china cabinet, recessed bookcases, vanity table with built-in mirror, seven large closets with doors sliding into the walls, automatic water heater and kitchen ventilating fan.

Heated from Ceiling

Let's take a closer look at one of these dream homes. Its dimensions are 31 by 35 ft, in which area will be found a 14 by 16 ft living room, two bedrooms, a dining alcove, kitchen, utility room and bath, all on one floor. The attic space is used for structural members and for heating and insulating. The home has a radiant-heating system operating from above the ceiling. Hot air from an overhead oil or gas furnace circulates through a chamber built in the ceiling. As the temperature of the ceiling increases, heat rays are radiated downward. (It is true that hot air rises but heat itself radiates in all directions). Since hot air does not circulate through the house, there are no air currents to carry dirt and soot around. The 6-in. Fiberglas insulation immediately below the roof and the 1½-in. insulation of the walls keep most of the heat within the house.

The living room (Fig. 2) has a large picture window and built-in bookcases in combination with a central wall recess suitable for the installation of a large mirror. Between the dining alcove and kitchen is a wall with a service "pass-through." This wall serves a double purpose; the dining side holds a china cabinet and the kitchen side cabinets and work table.

Built-ins and sliding doors are again used to full advantage in the bedrooms. The 12 by 12 ft master bedroom (Fig. 3) has a built-in vanity table with a large mirror; this useful piece of equipment is flanked by two floor-to-ceiling closets and surmounted by overhead storage compartments for luggage and blankets. There is also a floor-to-ceiling closet in the other bedroom, and a third closet with shelves for



6—ROOF TRUSSES being anchored into place. The ten roof trusses are fabricated as half trusses in the factory, then bolted together in the field

linen storage is located conveniently between the two bedrooms. All of the doors open by sliding into the wall.

The bathroom contains the usual fixtures and also built-in soap dishes, a cabinet and a pole for a shower curtain. Still another closet with sliding doors is located immediately outside the bathroom.

There is no basement. The utility room adjacent to the kitchen holds the automatic water heater, radiant-heating plant and a large broom closet. There are also built-in hooks for indoor clothes lines. Because the suspended heating plant takes up no floor space, bulky home equipment such as a deep-freeze unit or an ironer can be placed immediately under it.

Copper plumbing and conduit wiring are built into the wall sections for life. Service panels in the utility room provide easy access to meters, switches and plumbing connections. Window screens come with the house, while storm windows may be ordered as accessory equipment.

Assembled by Bolting

The foundation is a poured concrete floor slab, prepared with special attention to insulation and moisture protection. Wall sections (Fig. 4), consisting of spot-welded rolled-steel members, are bolted to a steel foundation plate embedded in the concrete. One of the wall sections includes the plumbing for the kitchen, another the plumbing for the bathroom (Fig. 5). When all 28 of the wall sections have been erected, the ten roof trusses are anchored into place (Fig. 6). Gable ends are attached to the outer trusses, and the house is ready to receive its walls and roof. Erection time of a complete home is set at 130 to 140 man-hours at the site. Some 2,000 specially built semitrailers will eventually be used to ship out Lustron homes, each trailer spending about four days at the building site, where it serves as a mobile warehouse.

Plans for the Lustron home were viewed and reviewed by all federal housing agencies; skeptically examined and re-examined by officials of the Reconstruction Finance Corporation. The well-known engineering firm of Stone and Webster was called in by RFC for advice and gave an unqualified endorsement to both engineering and business angles.

Lustron not only had to design a home and tool a factory to produce it; it had to face the even more tremendous problem of meeting all of the building codes in the United States. That the company in its brief 1½ years of existence has so far been only partially successful in meeting the totality of codes is scarcely surprising. There are some backward areas—and in this instance the backward areas are usually the largest cities—which have not yet amended their antediluvian restrictions to allow a prefabricated steel home to be built. No matter. The country wants the Lustron house, and it has come to stay. Sooner or later public pressure will force a revision of the archaic and outmoded codes which now hamper housing construction.

Lustron's dynamic President Strandlund was born in Sweden, came to the United States when four years old. His experience in American industry has been as successful as it has been varied; among his contributions to industrial development is the unit assembly plan which feeds ready-made units to main assembly lines. Strandlund's technical planning and execution reached a high point during World War II when he was backed by the government to the tune of $700,000 to find a means of speeding up the production of tank armor plate. He came through with a process which improved the plate while cutting its production time from 14 hours to eight seconds. This was called the outstanding wartime contribution in the whole Chicago area by the Chicago Ordnance District.

Plant and Personnel

Mr. Strandlund launched his new enterprise at the former Curtiss Wright airplane plant on the eastern outskirts of Columbus. This plant has more than 1,100,000 square feet of factory floor space and adequate room for executive and general offices. It took over $13,500,000 to tool it, but it is today one of the most modern and best equipped plants to be found anywhere in the country. The equipment includes 163 presses and fabricating machines, one of which is a monster press that performs five operations at once in stamping out the basic 2 by 2 ft panels from coiled 20-gauge steel. There are, at hand or on order, 150 resistance welders of rocker-arm, gun and press types and 19 special machines. There are 23 huge mills to mix the frit for the porcelain, automatic sprayers and baking furnaces where a heat of 1,300 F is obtained to fuse the porcelain enamel to the steel. Impurities such as oil and grease which might interfere

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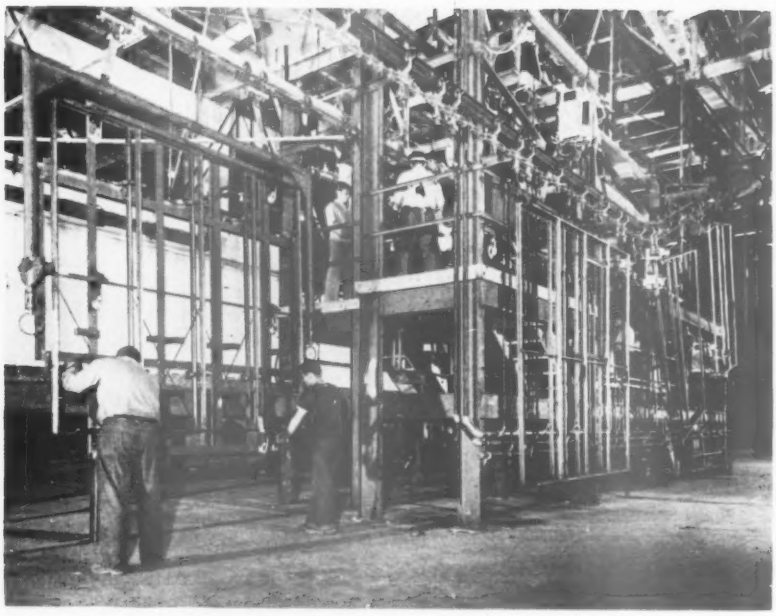
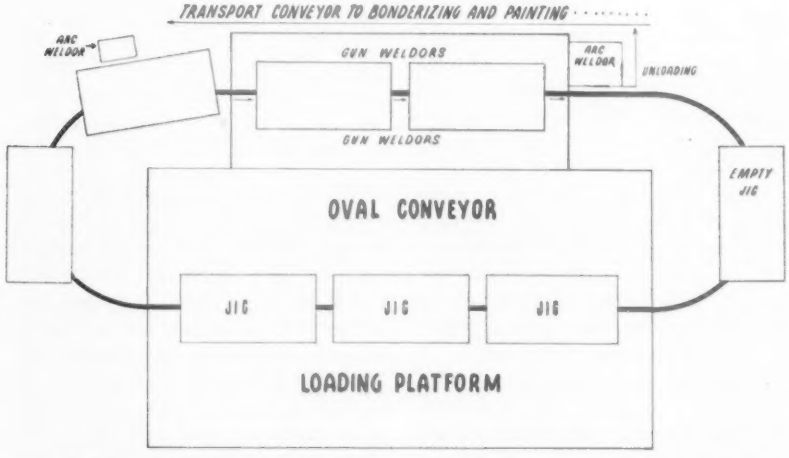
Wall Sections



7—WORKING ON THREE LEVELS, gun weldors spot weld wall sections as they pass on an overhead conveyor. The two men on the left are removing a welded section, which they will transfer to another conveyor to be carried through bonderizing equipment, which is just visible at the extreme right



8—PLAN OF WELDING STATION for wall sections. Arc weldor on the left tacks bottom spacer and vertical studs; his mate on the right welds top spacer. There are more traveling jigs than are depicted in above schematic diagram

with enameling are removed by three huge pickling machines, through which the stamped steel panels pass on conveyor racks.

President Strandlund has drawn on the aircraft, automotive and ceramic industries to surround himself with a picked group of executives, engineers and technical experts. Some of the men responsible for the present efficient welding setup are Ernest Olsen, plant manager; David Genter, general superintendent; Robert Runyan, chief engineer; Ted Beck, welding engineer; W. H. Kearns, assistant welding engineer, and Charles K. Good, welding supervisor for the shop.

A Lustron home has between 3,500 and 4,000 detail parts (exclusive of 4,000 nuts, bolts and screws), which are factory-joined into 1,100 assemblies. Of the latter number, 450 are welded assemblies. The main welding centers about the production of structural wall sections and roof trusses. Highly ingenious combinations of jigs, conveyors and welding machines have been arranged to produce these assemblies.

Wall Sections

At present there are two welding stations for wall sections (Fig. 7), accommodating a total of 26 jigs. These can hold all of the 23 wall sections needed in a home since three of the smaller 2-ft sections can be assembled in a single jig. The wall sections are 8 ft high and vary in width from 2 to 8 ft. Allowance must be made for eight window frames and two doors. The standard 8 by 8 ft section has top, bottom and intermediate spacers (14-gauge cold-rolled mild-steel channel sections), eight vertical wall studs (16-gauge "hat" sections) and six stay rods (3/8-in. rods). These members are loaded on a vertical jig and clamped into position with hand clamps. The loaded jigs are then carried by an overhead continuous conveyor to the gun-welding platform.

At each welding station, the continuous conveyor travels clockwise around a long oval like a racetrack course, having two straight sides and two relatively short curved ends. The loading platform is located along one of the straight sides and the welding platform directly opposite it (see sketch, Fig. 8). Just before gun welding is reached, the bottom spacer and vertical studs are arc tacked together, and after gun welding, the top spacer is similarly arc welded to the vertical members. The welded wall section is then unloaded from the jig (which returns to the loading platform) and is picked up by an overhead transport conveyor to be carried through bonderizing and painting operations. When the two oval conveyors have completed a turn apiece, all of the wall sections needed in one house have been welded.

One of the present two wall-welding stations has 16 guns and the other ten guns, all air-operated guns of 75-kva capacity. Welding is done on three levels, the guns on the intermediate and top levels being used to weld in the window frames. It takes four men to load and unload the jigs and twelve men in the assembly line to handle the 16 guns at the larger station.

Plans call for the installation of a third welding station with another continuous conveyor and 26 additional jigs to bring the total number to 52. When this expansion program has been completed each of the three stations will have 16 welding guns—eight of 100-kva and eight of 75-kva capacity. As is currently the case, welding will be done on three levels at each station and from both sides of the conveyor. Four guns will be located at the bottom level (two on each side), six guns at the intermediate level (three on each side) and six on the upper level (three on a side). When the three conveyors have each completed a circuit, wall sections for two houses will have been welded.

Window frames—to speak more precisely, the frames in which the window frames fit—are joined together at a welding station that resembles the wall-section stations but is on a smaller scale. Six jigs hold assemblies which travel on a smaller continuous conveyor and are welded by two 50-kva guns. Eventually there are to be eight jigs so that the eight frames necessary for a house can all be welded at a single conveyor turn.

Two utility walls contain all of the copper piping needed for plumbing. One of these walls is located between the utility room and bathroom; the other in front of the kitchen sink. The pipes are joined together by silver-brazed joints made with oxyacetylene torches. Oddly enough, the codes of some cities forbid the use of copper piping so that much less corrosion-resistant steel pipes have to be substituted in houses delivered to these particular areas. All of the necessary electrical wiring is also completed on the wall sections before they leave the Lustron factory.

Roof Trusses

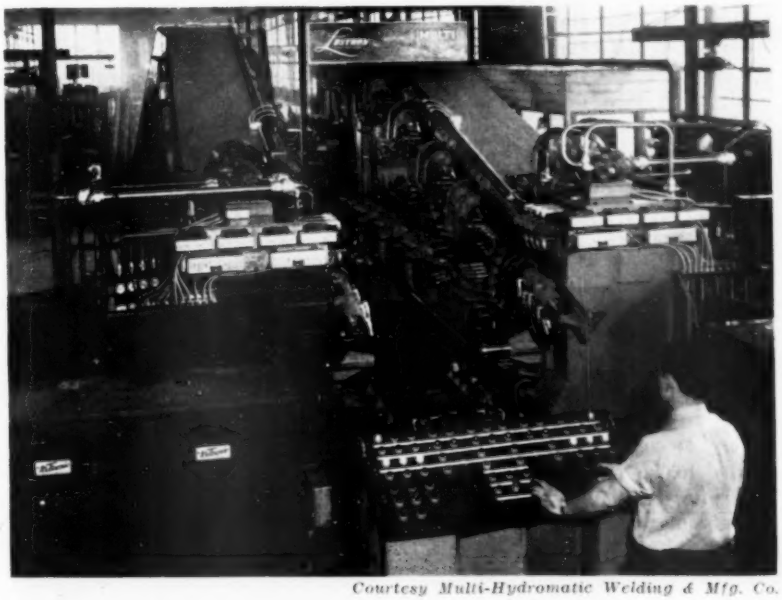
The ten roof trusses needed on a home are prefabricated as 20 half trusses and bolted together during erection. The half-truss section is a right-angle triangle 16½ ft long by 4 ft deep. Its components are:

One roof runner—a hat-section of 12-gauge cold-rolled mild steel. The heaviest steel used at Lustron is employed for this member.

Four vertical studs—hat-sections of 16-gauge rolled steel.

Roof Trusses

9—GUN WELDING roof trusses. The jigs travel on tracks and are loaded and unloaded at both ends of the platform. It takes 8 weldors, 2 loaders



Courtesy Multi-Hydromatic Welding & Mfg. Co.

10—MULTIPLE-TRANSFORMER welder with six conveyor-mounted fixtures will soon be used for roof trusses. It has 34 transformers and 68 guns

One lower chord, a rolled section of 14-gauge steel. The ⅛-in. studs that hold the ceiling insulation are welded to this member by means of automatic stud-welding guns before it is assembled in the truss.

Three stay rods—diagonal braces sheared from ⅜-in. rod stock.

One eave hanger plate.

Two corner gussets.

Two center connectors for the bolts for field assembly.

One ceiling runner, from which the ceiling panels are suspended.

These various members are assembled on two assembly jigs, located at the two ends of the welding platform (Fig. 9). These jigs shuttle back and forth on a track and are alternated so that one truss sec-

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Courtesy The White Motor Co.

11—TRUCK with special semitrailer carries a complete home package to any building site in the United States. Note utility wall and window-frame sections

12—LOADING porcelain-enameled steel panels onto trailer. At peak production of 180 homes a day, Lustron expects to load a trailer every eight minutes

tion is being welded while the next half truss is being loaded. Loading, welding and unloading are done in a total time of three minutes per half truss. Clamps are air-operated and controlled by time-delay switches which are actuated automatically at the end of a preset interval to operate all of the clamps simultaneously.

Loaded and clamped, the jig moves into the welding station where the lower chord and ceiling runners and the lower ends of the stay wires are welded. It then drops to a lower level for welding along the roof runner, after which it raises and moves out for unloading while its mate at the opposite end is being wheeled in to be welded.

Two men load at each end. There are eight weldors, four on each side, and twelve 75-kva guns, six on a side.

Multiple Welding System

The above welding method is shortly to be supplemented by an automatic installation that will turn out about two-thirds of the half trusses. Making use of six fixtures and an automatic multiple-transformer welder, the new equipment will be able to produce 1,333 half trusses in a three-shift day—almost enough for 67 houses. At 100% efficiency in operation, it will be able to produce 72 truss sections per hour.

Claimed to be the largest fully automatic multiple spot welder ever built, the new welder (Fig. 10) weighs 71,000 lb and has 34 transformers and 68 welding guns. During the machine cycle, 44 of the guns shift their positions (index) to make a total of 164 welds in 47 seconds.

The six fixtures in which the roof trusses are to be assembled will move on a continuous conveyor somewhat similar in type to the ones being used for wall sections. When fully assembled, the welder, its fixtures and its conveyor system will be approximately 60 ft long. The entire installation will cost in excess of $100,000.

The multiple-transformer welder was developed by H. G. Warnke of Detroit as an improvement on the earlier "hydromatic" multiple welder which Warnke designed and built for the automobile industry. The hydromatic multiple spot welder works essentially in the same manner as the spark distributor on an automobile engine in relation to the spark plugs. The hydromatic unit (distributor) forces oil to actuate the welding guns (spark plugs) on a rotation basis. In the multiple-transformer process, up to four welding guns can be fired from a transformer at one time.

Stud-Welding Guns

Mention must also be made of the 17-gun automatic stud welder that has just been installed to weld studs of ⅛-in. diameter and 1½-in. length to the lower chord of the roof truss. This installation is reported to be the largest automatic stud-welding machine ever put into operation by its manufacturer. The welds are made in series so that the total current drawn at any one time is no more than 300-310 amp. The sequence of welds through all 17 guns takes only five seconds to complete. An automatic-clamping and locating fixture holds the chord member in the correct position to receive its 17 studs, function of which is to hold up the ceiling insulation.

Next to the currently operating double-traveling roof-truss station is a miniature edition of it with eight 50 and 75 kva welding guns. Here gable-end assemblies are fabricated on horizontal jigs.

The remainder of the welding done at Lustron consists mostly of panel assemblies. Total resistance-welding equipment on hand or on order consists of 75 welding guns, 50 to 100 kva; 50 rocker-arm spot welders, 30 to 50 kva, and 25 press-type welders, 75 to 250 kva, used for both projection and spot welding. Projection welding is employed whenever the assemblies can be designed to allow for the making of several welds simultaneously.

Tooling for Production

Assistant Welding Engineer William H. Kearns was invited to address the recent tenth annual Ohio Welding Conference on the subject of tooling for resistance production. His remarks on this occasion are well worth quoting:

"If it is possible to move the work to the machine, we use standard rocker-arm spot welders. If it is not possible to move the work to a machine, then portable gun welders must be used. Our projection welding is confined almost entirely to roof-section sub-assemblies which have been specially designed for this process. All of our welders are air-operated, not because of the inherent advantages of air operation but chiefly because air was readily available when we moved into the plant. Motor-operated spot welders will

work just as well if not even better.

"We require gun-welding units to be simple in design, light in weight. Knockouts on the holders make it easy to change tips for redressing. Sleeve-type adapters enable quick changes to be made for different subassemblies, offering a considerable advantage for light types of work. A safety cable should always be used to suspend the gun and welding transformer, which together weigh close to 2,000 lb. Every gun should be well counterbalanced so that the operator won't kill himself when he tries to move it. Maximum welding cable length should be 8 ft; a 6-ft length is to be preferred. In order to assure adequate cooling water, a manifold should be installed to permit separate water hoses to be run to the transformer and to the gun.

"Projection welding can be used on heavier gauges as well as on light metal. Our advice is to have replaceable inserts on the dies wherever possible. The inserts of a die should be machined together to make sure that they will line up properly. If it is not possible to use inserts, then some quick method of connection should be provided to facilitate die changes. For fastening of dies to the platens, it is best to use brass bolts and a threaded brass bar sliding into the T-slot of the platen. And the work must be clean for successful projection welding. Any oil or scale on the steel will cut down tremendously on the life of the dies.

Automatic Machines and Jigs

"Lustron has restricted the use of automatic machines to a minimum because we feel that such types of welding can only be used on assemblies especially designed for an automatic process. Moreover, production must be sufficient to justify the high cost of the automatic machine. When production is sufficiently large, however, the expensive automatic installation will soon pay for itself.

"Jigs rather than fixtures built on the welders are used to position most of the work at Lustron. Jigs must be simple in design, light in weight, easy to load and unload. A basic concept that should never be neglected is that it must be possible to unload the jig after the parts have been welded. We purchased most of our jigs from outside, and we learned from experience that the most expensive jigs were nearly always the heaviest and the least satisfactory. Nevertheless, the framing should be of sufficient mass so that there is no heat warpage nor deflection in the jig itself.

"Jigs to be used with welding guns must be coördinated with the gun design. It may be necessary to trunnion or rotate the jig in order to make it possible to reach all of the welding points.

"With regard to maintenance, we assign one man to a specific group of welders and make him responsible for their operation. A maintenance man is required to be a jack of all trades. It is important to have efficient, alert personnel who are able to exercise good judgment. It is equally important to stock complete sets of spare parts for every type of machine so that replacements may be made with a minimum of down-time.

"RWMA specifies that the pressure switch initiate the weld time, and most welding controls are so made. We prefer the pressure switch to initiate the squeeze time since this makes sure that the head is down before the welder fires. One of our particular problems is to avoid spot-weld indentations on the show side of the porcelain-enameled panels. Weld indentations show up with far greater clarity after enameling than they ever did before.

"There are four chief reasons why you may not be getting a decent spot weld. In order of frequency of occurrence, they are:

"(1) Tip diameter is not right for the job.

"(2) Stock is dirty—oil or scale must be removed.

"(3) Set-up of the welding machine is at fault.

"(4) Welding control is at fault. This is the least likely of the four.

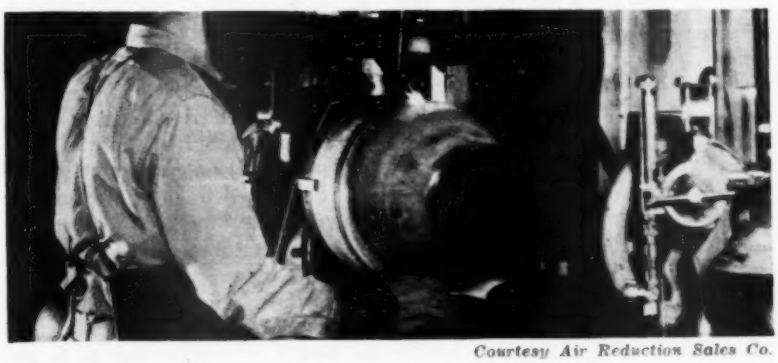
"Steel thicknesses welded at Lustron vary from 28 to 12 gauge, the heaviest gauge being used on the roof runner member of the trusses."

Trailer Transport

Truck transportation is the method used to deliver the Lustron home from the factory in Columbus to the erection site. All of the parts and assemblies which form the company's complete home package are loaded on a specially designed semitrailer (Fig. 11) that may be hauled by a motor truck to any location in the country. The trailer has 80 compartments and is loaded as shown in Fig. 12 from stockpiles at the ends of the factory production lines. The shipping department utilizes continuous chain and roller benches, and at peak production will be expected to load a trailer every eight minutes. A fully loaded trailer weighs 46,000 lb.

Out "on location," the trailer becomes a construction warehouse in which the parts are safely locked when the erection crew has left the job for the day. There are no delays in construction because of material shortages and no waiting because some small item is missing. The structural sections used first in erection are last to be loaded at the factory, and an orderly sequence is followed throughout so that panels, roof tiles and equipment do not have to be unpacked until they are actually needed.

Production of the Lustron packaged houses is Big Business with two capital B's. Columbus is fortunate in being the site of a new basic industry offering virtually unlimited potential for growth.



Courtesy Air Reduction Sales Co.

MILK PAILS of stainless steel are now fabricated by the Hinman Milking Machine Co., Oneida, N. Y., using the inert-arc process with helium gas and type 321 electrodes. Formerly, the pails were drawn from plain-carbon steel

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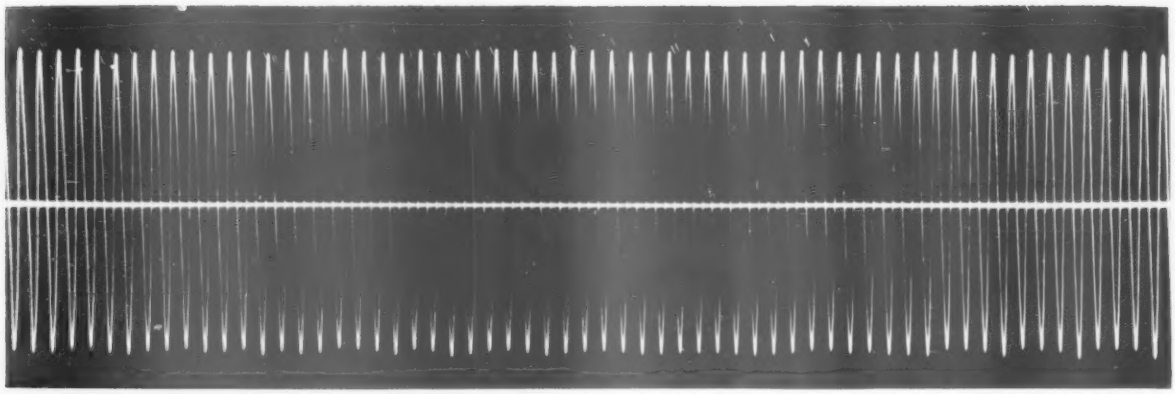


OSCILLOGRAM of the arc current supplied by a balanced-wave, capacitor-stabilized inert-gas-shielded arc welder

Balanced Waves for Inert-Arc Welding

BY R. F. WYER
General Electric Welding Divisions, Fitchburg, Mass.

PART ONE—Mr. Wyer explains why the inert-arc process attempts to change alternating into direct current and gives methods by which the annoying tendency toward current rectification can be avoided

In view of recent developments in connection with Federal Communications Commission rules regarding radio interference as well as questions regarding the relative effectiveness of balanced and unbalanced waves, it might be well to have a more detailed look at the inert-arc welding process.

Fig. 1 shows a conventionalized view of the welding arc zone. There are four major elements involved. First, the workpiece—very much a variable but it can be dismissed for the moment. Second, the tungsten electrode, 99.9% pure. Third, the envelope of inert gas, 99.8% pure. Finally, there is the welding current, the amperes which make the arc itself.

Purer Than Ivory Soap

It is worth noting that both the tungsten and the inert gas are extremely pure—even purer than Ivory soap. This is fortunate for our purpose because it permits a close study of conditions in the arc which would be obscured by contaminating influences or chemical reactions in other types of arc welding. Hence an understanding of some of the fundamentals in inert-arc welding may also lead to a closer understanding of fundamentals of other welding arcs. What are the results of applying this combination of pure items to do a welding job?

First, an extremely clean welding area. Flux is not required, so chemical reactions need not bother us. There is no slag except what may be already in the workpiece. Visibility is excellent; every detail of the molten pool can be seen.

Second, a concentrated source of heat. This means fast welding. It means minimum heat input to the work with consequent reduction in the width of the heat-affected zone and remarkable freedom from distortion. Since there is no flare of flame and practically no spatter, the process can be applied in close proximity to materials that are not proof against high temperatures.

Third, the process gives close control of the addition of filler metal. If required, filler metal may be added by means of a filler rod as in gas welding or atomic-hydrogen arc welding. There is no inherent deposition in the tungsten-arc process. Thus the quantity as well as the nature of the filler metal can be closely controlled.

Let us now look at the electrode in Fig. 1. Its twofold function is to resist intense heat and to carry electricity. Tungsten has thus far been found to be the most practical electrode material. It is a good emitter of electrons when at high temperature; it has a very high melting point, and it is also relatively durable. Carbon and other materials like molybdenum, tantalum and even some sintered materials like carborundum have been tried out as electrodes, but tungsten seems to do the job best.

Tungsten Loss

Tungsten does not enter the weld itself under good conditions. Sometimes there is loss of tungsten. One of the factors influencing this is current density. If the current density in the electrode is too low, tungsten will be lost by erosion (not by melting). Contrary to what seems logical, the tungsten loss can be reduced by increasing the current in the electrode or by using a smaller electrode, which amounts to the same thing. This holds true only up to a certain

point. If the current density is too high, tungsten will be lost by melting and dropping off. Normally, the lower surface of the tungsten should be red-hot but not sufficiently plastic to form a large ball at the end. The proper current level will depend on a number of conditions. A good rule-of-thumb is to use 1¼ amp for every 0.001 in. of tungsten diameter. This is for balanced-wave a-c. The current density must be less for reverse polarity d-c and should be greater for straight polarity.

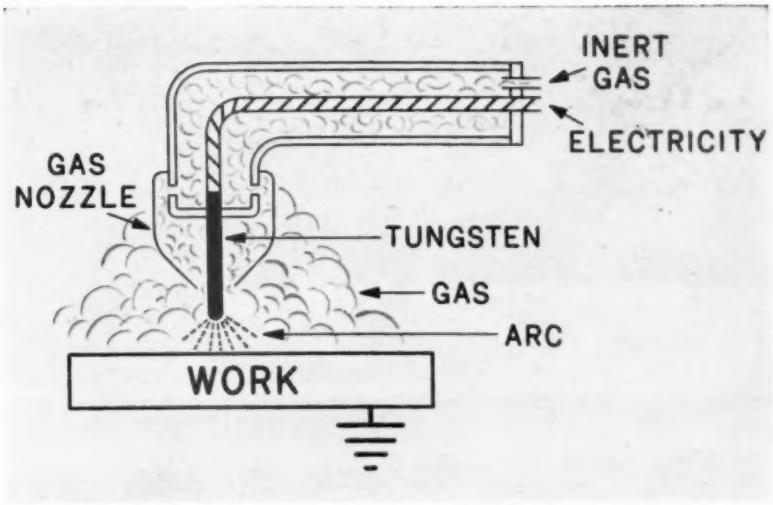
Tungsten may also be lost by rapid spitting at the moment when the arc is started. With normal current densities, this is not a problem except when the tungsten has been oxidized. If the shielding gas is shut off immediately after a weld while the tungsten is still red-hot, the tungsten will be immediately oxidized upon contact with the air. The oxidation can be observed as a cloud of white smoke coming from the tungsten. If an electrode is in this condition, the next time the arc is struck a very considerable quantity of tungsten will be thrown down into the weld pool, adding to the loss already occasioned by oxidation.

If these causes are avoided, the loss of tungsten is negligible, and it can truthfully be said that the tungsten does not enter the weld.

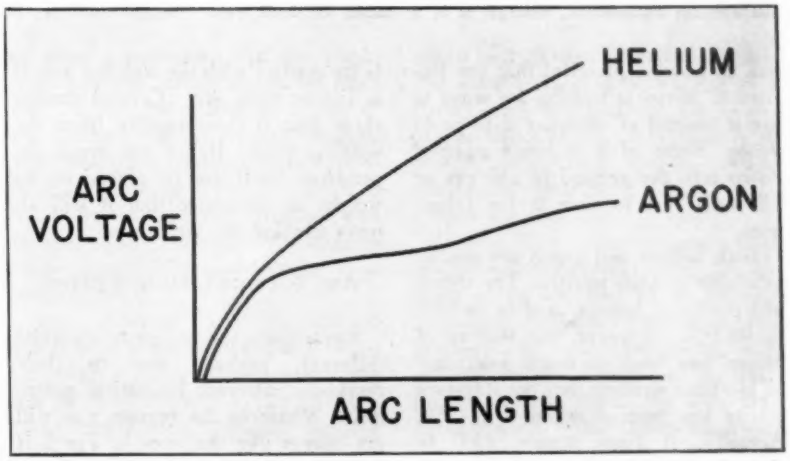
The Inert Gases

What about gases? Helium and argon, the two gases used for shielding, are alike in being totally inert. They are both charter members of that tight little group of six gases which consistently and obstinately refuse to make a chemical combination or reaction with any material. Nitrogen is not a member of this group, though it is usually chemically inactive at ordinary temperatures. But nitrogen reacts with iron to form iron nitride, and a little nitrogen in inert-arc welding gas can be spotted immediately by the black crust it leaves on the surface of the aluminum.

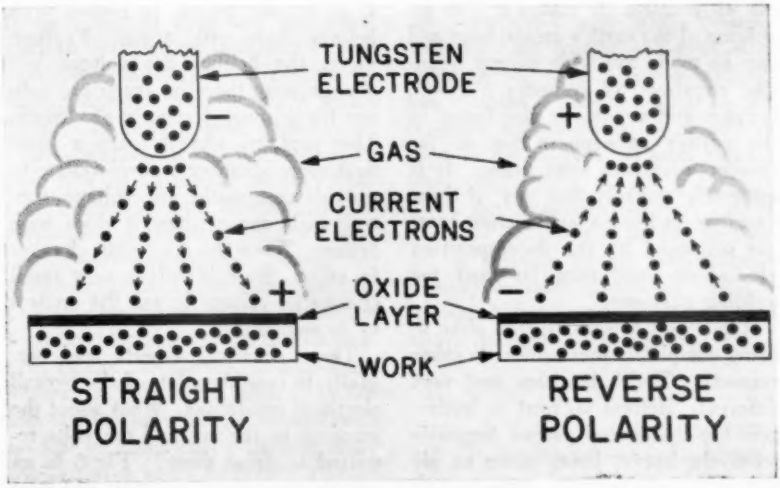
Helium and argon are truly inert like neon, krypton xenon and radon, the other members of their club of chemical snobs. Helium is produced from natural gas wells by the Bureau of Mines, which has plants arranged to strip helium from natural gas on its way to industrial and other users. The helium, which may run as high as 1% of the volume of the natural



1—INERT-ARC welding process involves four major elements; the work, the tungsten electrode, the envelope of inert gas and the welding current



2—ARC VOLTAGE characteristics with helium and argon. Voltage for a given arc length is lower with argon, which thus needs a more sensitive control



3—STRAIGHT AND REVERSE polarity welding ares. Reverse polarity requires a larger size of tungsten electrode for a given welding current

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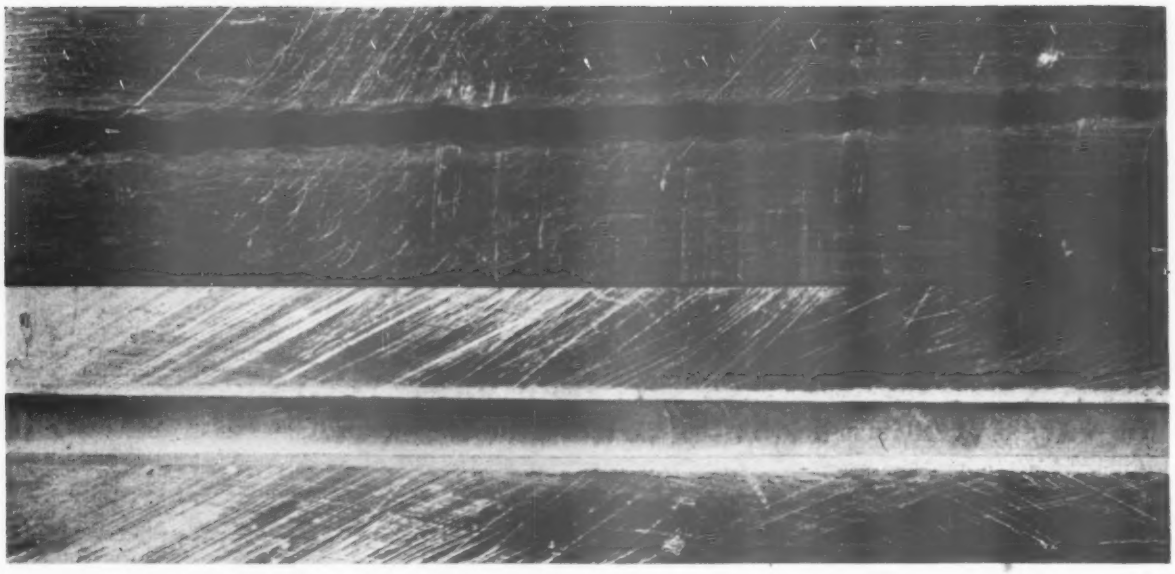


4—STRAIGHT POLARITY (top) leaves a dirty, crusty surface on aluminum, though it is a stable arc and well suited to other materials. Reverse polarity gives a clean, bright surface, but the arc is wild and hard to control

gas, is now so plentiful that the Bureau of Mines is looking for ways to use it instead of allowing it to go to waste. Some of it is being pumped down into the ground in old gas or oil wells just to save it for future uses.

Both helium and argon are readily available in high purities. The standard purity of helium used to be 98.2 to 98.4%. However, the Bureau of Mines has been so much interested in inert-arc welding that the standard purity has been changed to 99.5%. Actually, it runs nearer 99.7 to 99.9%, although 99.5% is its nominal "ratio."

Argon is in almost limitless supply because it is one of the gases in the air we breathe. It makes 0.94% by volume of the earth's atmosphere and can be made available in any quantity required by industry. Neon, krypton and xenon are also found in the earth's atmosphere but in far smaller quantities than argon. It is extremely unlikely that any of these gases or radon—a radioactive inert gas produced by the decomposition of radium—will ever be used for welding purposes.

Argon and helium, though alike in being completely inert, differ in other respects. Their densities are very different. Helium is, next to hydrogen, the lightest of gases. Argon is re[illegible]ly heavy, being close to air [illegible] However, the difference is [illegible]s as great as it may seem. [illegible]on is highly heated, as it is by contact with the welding arc, it is lighter than air. Careful studies show that it rises rapidly from the welding zone. Hence too much dependence must not be placed on its weight as assurance that it will always blanket the weld area.

Arc Voltage Characteristics

Electrically, the two gases are quite different, perhaps due to their markedly different ionization potentials. Whatever the reason, you will get curves like the ones in Fig 2 if you measure the variation of arc voltage with changes in arc length for the two gases, holding other conditions constant. The arc voltage for a given arc length is higher with helium than with argon. Furthermore, the helium arc voltage will change more than the argon arc voltage for a given change in arc length. This explains why it takes a great deal more sensitive control system to provide automatic arc voltage control with argon than it does with helium. When the arc length changes in argon, there is only a very small change in voltage to tell the control to do something.

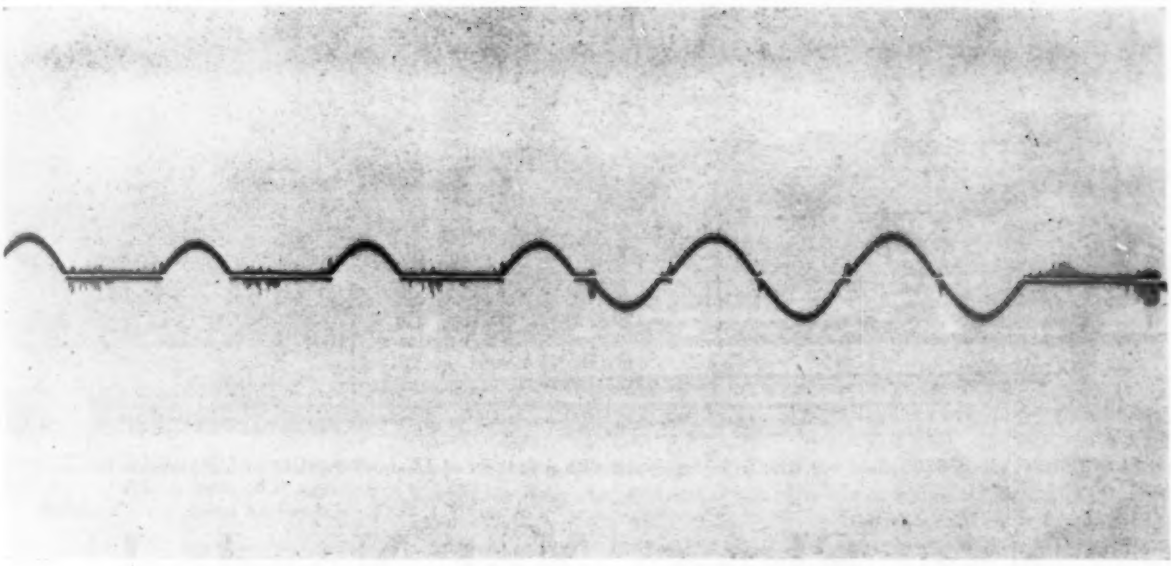
These electrical aspects lead naturally to consideration of the overall electrical conditions. What about the amperes in the arc and the volts required to drive them? Fig 3 is an artist's conception of two different direct-current arcs: one of straight polarity (electrode negative) and the other of reverse polarity (electrode positive). In straight polarity, the electrons, little particles of negative electricity, travel down from the electrode to the work. In reverse polarity, they travel up.

The difference in the direction of the electron flow makes some very noticeable differences in electrode and the work. With aluminum, for example, straight polarity produces a dirty, crusty surface like that shown in the upper half of Fig 4. Reverse polarity, on the other hand, will produce a bead with a clean, bright surface as in the lower half of Fig 4.

If you try to weld two aluminum pieces together with straight polarity, the molten portions of the two plates will not run together and intermingle and form a weld because of the dirty skin on them. With reverse polarity, the molten surfaces are clean and flow together like two drops of water. Other considerations, however, make reverse-polarity aluminum welding impractical in production.

Effects on Electrode

The effect of straight and reverse polarity on the tungsten electrode are likewise very different. With reverse polarity, the tungsten runs hot and a large electrode must be used to prevent excessive melting. With straight polarity, the electrode can carry very much heavier current without getting too fluid. To put it in specific terms, it takes a ¼-in. tungsten to handle



5—R-F PILOT VOLTAGE at first failed to keep arc going except in the straight-polarity direction Hence the bottom half waves are missing at left of oscillogram. On right side arc was started with current flowing in both directions

100 amp in reverse polarity welding of aluminum with argon, but a 3/32-in. or even 1/16-in. tungsten will handle 100 amp if straight polarity is used.

At a given current, the voltage across the arc, measured between the tungsten and the work, will be very different in arcs of straight and reverse polarity. A 10-volt straight-polarity arc would measure about 16 volts if the polarity were to be reversed. We have now hit upon the fundamental reason why the inert-arc process attempts to rectify alternating current; that is, to change it from alternating to direct current.

Before we go into that, however, let's summarize the more simple d-c arc characteristics. First, the straight-polarity arc produces little heating on the tungsten electrode. It will not clean up the surface of aluminum and magnesium, but it is a steady, stable, usable arc on other materials. In contrast, the reverse-polarity arc produces very great heating on the tungsten. It cleans up the surface of the molten pool in aluminum and magnesium. However, it is a wild arc, one hard to control. It tends to wander excessively and is difficult to direct where you want it.

Current Rectification

Coming now to alternating current and rectification, consider Fig. 5. This oscillogram shows graphically the rise and fall of the current value as time progresses. At the right-hand end, the current alternates from one side of the central zero line to the other in a fairly smooth manner. With 60-cycle current, it takes 1/60th of a second to go from zero down to maximum in the down direction, rise to zero again, continue to maximum in the up direction and decrease once more to zero.

How different from this are the waves seen at the left-hand end of the oscillogram! The bottom half waves are entirely missing. This is complete rectification, meaning that the electrons are emitted from only one of the surfaces at the ends of the arc, in this case, the tungsten. The aluminum work fails to emit electrons so that the current flows only in the straight-polarity direction. The tendency to do this was indicated by the previously mentioned differences in arc voltages: 10 volts straight polarity and 16 volts reverse polarity.

Incidentally, it is interesting to note how like a tungar rectifier bulb this tungsten-argon welding arc is. Both have a tungsten electrode and an argon atmosphere. Tung for tungsten, ar for argon makes tungar.

There are three ways in which the tendency toward complete rectification in the tungsten-argon-aluminum arc can be overcome. One is by the use of high open-circuit voltage such as 150 or 200 volts. Another is by the use of a radio-frequency voltage high enough to cause pilot sparks to jump across the arc gap. These might be 3,000 or 4,000 volt impulses. The third method is by the use of a circuit made inherently stable by the proper distribution of capacitors to provide stabilizing current pulses when the welding current wave crosses the zero line.

In Fig. 5, a radio-frequency pilot voltage was employed to keep the arc from going out and in an attempt to prevent complete rectification. The presence of radio-frequency discharges can be detected as the little pointed bumps along the zero line. Each of these "pips" represents a very short burst of 400-kc current. While the current was zero, the arc was out. On the left-hand side, we see how the radio-frequency sparks attempted to get welding power to flow again. They succeeded only when it came time for the tungsten to emit electrons again. The 60-cycle welding power flowed only so long as the tungsten was emitting electrons; as soon as the current hit zero, the arc went out.

On the right-hand side of Fig. 5, the pilot voltage was finally successful in starting an arc with current flowing in both directions. This is indicated by waves that are both above and below the zero line.

In next month's installment Mr. Wyer will discuss balanced-wave vs. unbalanced-wave welding. He will also consider production applications in aluminum, magnesium, stainless steel and copper.

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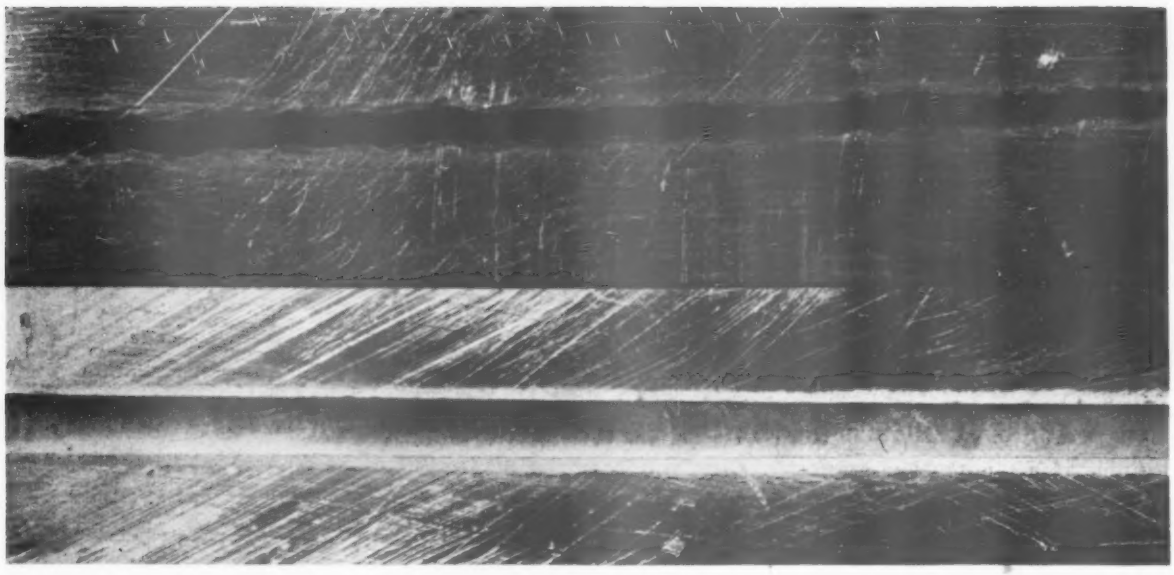

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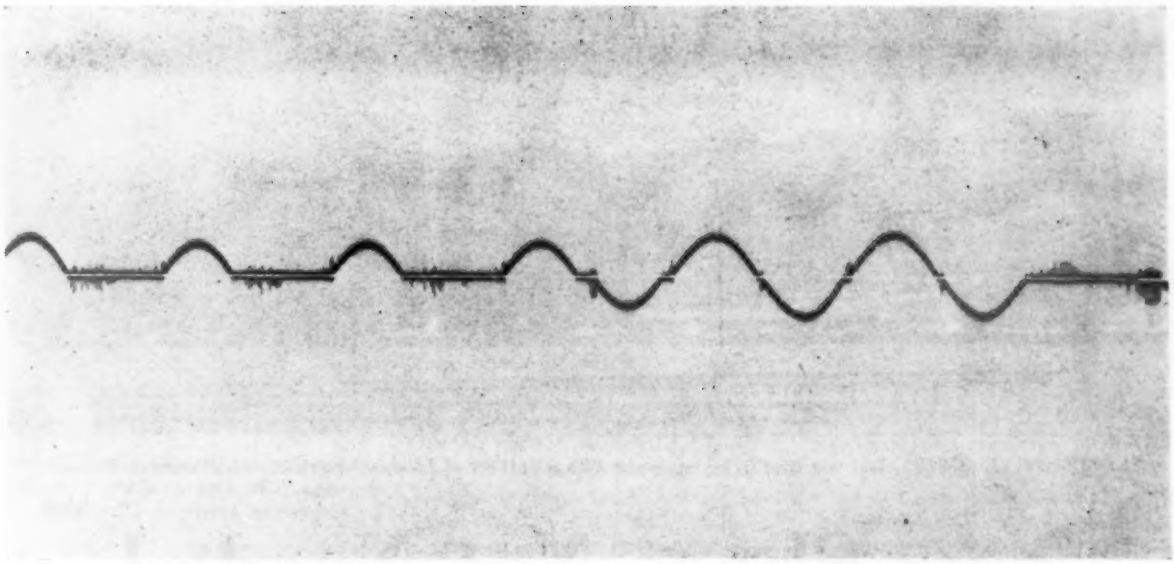

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How different from this are the waves seen at the left-hand end of the oscillogram! The bottom half waves are entirely missing. This is complete rectification, meaning that the electrons are emitted from only one of the surfaces at the ends of the arc, in this case, the tungsten. The aluminum work fails to emit electrons so that the current flows only in the straight-polarity direction. The tendency to do this was indicated by the previously mentioned differences in arc voltages: 10 volts straight polarity and 16 volts reverse polarity.

Incidentally, it is interesting to note how like a tungar rectifier bulb this tungsten-argon welding arc is. Both have a tungsten electrode and an argon atmosphere. Tung for tungsten, ar for argon makes tungar.

There are three ways in which the tendency toward complete rectification in the tungsten-argon-aluminum arc can be overcome. One is by the use of high open-circuit voltage such as 150 or 200 volts. Another is by the use of a radio-frequency voltage high enough to cause pilot sparks to jump across the arc gap. These might be 3,000 or 4,000 volt impulses. The third method is by the use of a circuit made inherently stable by the proper distribution of capacitors to provide stabilizing current pulses when the welding current wave crosses the zero line.

In Fig. 5, a radio-frequency pilot voltage was employed to keep the arc from going out and in an attempt to prevent complete rectification. The presence of radio-frequency discharges can be detected as the little pointed bumps along the zero line. Each of these "pips" represents a very short burst of 400-kc current. While the current was zero, the arc was out. On the left-hand side, we see how the radio-frequency sparks attempted to get welding power to flow again. They succeeded only when it came time for the tungsten to emit electrons again. The 60-cycle welding power flowed only so long as the tungsten was emitting electrons; as soon as the current hit zero, the arc went out.

On the right-hand side of Fig. 5, the pilot voltage was finally successful in starting an arc with current flowing in both directions. This is indicated by waves that are both above and below the zero line.

In next month's installment Mr. Wyer will discuss balanced-wave vs. unbalanced-wave welding. He will also consider production applications in aluminum, magnesium, stainless steel and copper.

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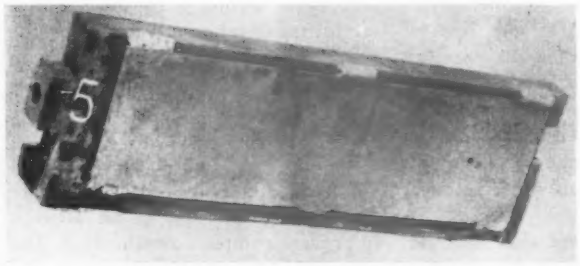
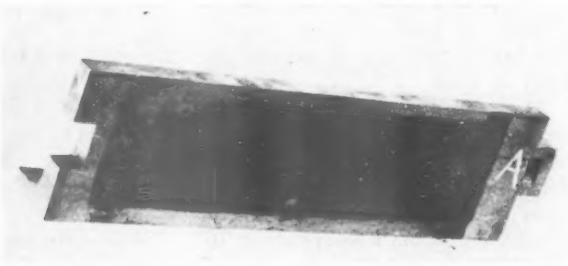
LOCOMOTIVE of 2200 class was first to be equipped with a full set of 16 shoes overlaid with aluminum bronze

New Shoes Not Needed

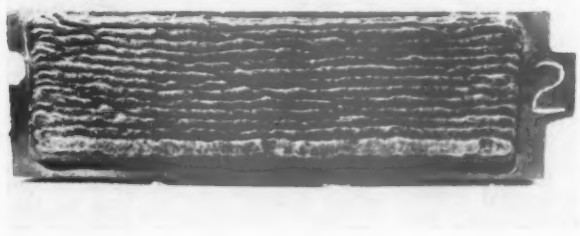
BY HOWARD C. CLOSE AND E. J. ST. EVE*



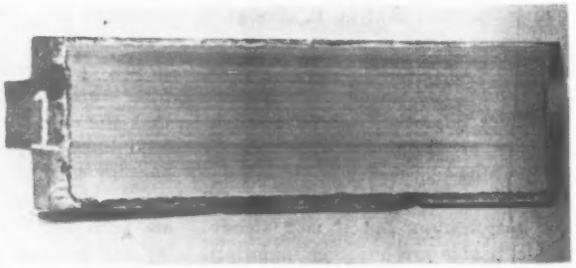
1—ORIGINAL SHOE with phosphor-bronze liner plate. Its life was 40,000 miles, considered a short distance



2—SANDBLASTED, cast-steel shoe is ready to be welded. Shoe is preheated at a temperature of 400-500 F



4—FINISHED OVERLAY, about 5/16 in. deep, was applied in two layers, taking some 20 lb of electrodes



5—MACHINED SHOE is ready for installation in a locomotive. It will not be inspected for 80,000 miles

AFTER months of continuous testing in the laboratory and on test locomotives, the use of an E CuAl-C electrode for overlaying roller bearing shoes was adopted by the Missouri Pacific Railroad Co., St. Louis, because the excellent wear-resisting qualities of the deposit extended the service life many times. The deposit is an aluminum-iron-copper alloy having high hardness and tensile strength combined with wear and corrosion resistance.

LINERS DIDN'T LAST

Prior to the adoption of an aluminum-bronze overlay for the bearing surface, a phosphor-bronze liner plate was tack welded to the cast-steel shoe, Fig. 1. Since the hardness of the phosphor-bronze plate averaged approximately 70 Brinell (500 kg load), this liner did not satisfactorily withstand the impact and sliding wear created by rapidly reciprocating parts and engine motion at normal operating speeds. Frequent inspection was necessary, inspection which included dropping of the

*Mr. Close is district manager, Machinery & Welder Corp., St. Louis, and Mr. St. Eve is field manager, Ampco Metal, Inc., St. Louis.

3—FIXTURE PROVIDES proper camber. Face of shoe is inclined at approximately 25 deg from horizontal

binders and the inevitable revelation of broken welds, loose liners and subsequent repair or replacement.

Replacement of liners, whether for looseness or excessive wear, was costly. The work almost always had to be done at an inopportune time, and the operation required more welding than originally as two additional edge welds and three plug welds in the middle of the liner had to be made. The additional welding was provided in an attempt to correct for breakage and loss of liners. Even when this correction was successful, however, service life was found to be only about 40,000 miles. To put it another way, the 0.045-in. maximum lateral tolerance of the shoes was exceeded in 40,000 miles, which in the railroad industry is generally considered a short distance.

Try Overlaid Shoes

In searching for new and better methods to reduce maintenance and running repairs, Missouri Pacific engineers decided to improve upon the tack-welded phosphor-bronze shoe liners if possible. After considerable testing of various methods and materials, the aluminum-bronze overlay was adopted on one set of 16 shoes to equip one of the Missouri Pacific Class 2200 locomotives. Deposit hardness of the alloy, as-welded, averages 200 Brinell (3,000 kg load) and ultimate tensile strength varies between 90,000 and 101,000 psi.

Periodic inspections of the shoes were made at prescribed mileages to determine the amount of wear on the bronze overlay. The wear was found to be so very slight, even at 150,000 miles, that it was decided to equip additional engines of the 2200 class. When performance on the additional engines proved to be consistent with the original overlaid shoes, the method was established for all roller bearing engines.

At the present writing, Missouri Pacific has three classes of roller-bearing-equipped locomotives. These are:

2200 Class: Northern type, 4-8-4 class. Tractive effort: 67,200 ft-lb. Weight in tons on drivers: 140. Total weight loaded: 489,000 lb.

2100 Class: Northern type, 4-8-4 class. Tractive effort: 66,640 ft-lb. Weight in tons on drivers: 140. Total weight loaded: 445,950 lb.

5321-27 Class: Mountain type, 4-8-2 class. Tractive effort: 53,720 ft-lb. Weight in tons on drivers: 122. Total weight loaded: 370,000 lb.

All three of the locomotive classes described above are equipped with or are in the process of being equipped with bronze overlaid shoes. Shoes for all three classes are similar, and variation is by dimension and weight, class for class.

Welding Procedure

The welding procedure for each class is almost identical. Following is the procedure used for the original application on the 2200 class:

1. Machine or sandblast surface to be welded, Fig. 2.
2. Mount shoe in fixture and tighten end clamps so as to provide a 3/16-in. camber.
3. Preheat 400-500 F.
4. Use a 5/16-in. electrode with d-c reverse polarity, 250 amp, 30 volts.
5. With the face of the shoe inclined at approximately 25 deg from the horizontal (see Fig. 3), run stringer beads from end to end of the shoe. Welding should progress from stringer to stringer, bottom to top until the overlay is finished (Fig. 4).

In following the foregoing procedure, welding should be done with a rapid weaving motion, a short arc and electrode inclined slightly in the direction of travel. Slag should be removed between each bead and between subsequent overlays necessary to build up to the required thickness. On completing the welding, the shoe is removed from the fixture and allowed to cool to room temperature. It is then finish-machined as in Fig. 5.

On a new shoe, approximately 5/16-in. of overlay is applied in two layers. This requires approximately 20 lb of 5/16-in. electrodes. Under ordinary circumstances, the welding time is about 3½ hours per shoe.

Longer Lived Shoes

As the result of applying aluminum bronze, shoe life has improved remarkably. On the 2200 class, northern-type locomotive, main (No. 2) binders are dropped at 80,000 miles as compared with 40,000 miles for the shoes lined with phosphor-bronze plates. Other shoe locations (1, 3 and 4) operate 300,000 miles from shopping to shopping. On the 5321-27 class, mountain-type locomotive, main binders are dropped at 140,000 miles, other locations at 300,000 miles. Even at these greatly increased mileages, very little wear is apparent on many of the shoes. Sometimes machine-tool marks are still visible on the overlay. Should wear be apparent, however, the shoe is rebuilt with one layer from ¼-in. electrodes, requiring a maximum of two hours welding time. It is then machined and is ready for another long period of trouble-free service.

The magnitude of saving involved is readily apparent when consideration is given to the fact that 16 shoes are required for each locomotive in the three classes described. Thus far, a total of 47 locomotives have been equipped; this number consists of 15 locomotives of the 2200 class, 25 of the 2100 class and seven of the 5321-27 class, each with 16 shoes. The method of using phosphor-bronze liner plates has become obsolete.

The authors wish to acknowledge and express their appreciation of the coöperation given by the following Missouri Pacific Railroad Company personnel: L. R. Christy, chief mechanical officer; O. A. Garber, chief mechanical officer, St. Louis (retired); L. H. Kueck, assistant chief mechanical officer, St. Louis; R. Moran, welding supervisor, St. Louis; C. R. Kilbury, superintendent, Sedalia shops, Sedalia, Mo.; H. W. Young, welding foreman, Sedalia shops; L. Hurforth, forging supervisor, Sedalia shops.

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NWSA

Three days of practical activities marked the course of the big

R. S. MARS, president for 1949-50, National Welding Supply Association

BY T. B. JEFFERSON

"BEST yet" was the comment of nearly all who were fortunate enough to attend the fifth annual meeting of the National Welding Supply Association, held at the Hotel Gibson, Cincinnati, May 11 to 13. Over 200 welding distributors and manufacturers met to discuss their mutual problems.

Convention activities really began on Tuesday May 10 with a dinner meeting of the NWSA executive committee and board of trustees. The convention itself got into full swing on Wednesday when the morning meeting was called to order by President Ralph E. Chase, who is also president of Chase Welding Supply Co., Benton, Ill.

The perennial question of taxes came up in the welcoming address delivered by Mayor Albert D. Cash of Cincinnati. "People of America are looking too much toward the national government for help," Mayor Cash pointed out. "A great deal of this difficulty is caused by the fact that state governments are depending more and more on federal subsidies. As a result, state governments are dying. The inertia and red-tape of national government are standing in the way of doing things that need doing. Every citizen should work toward the revival of state government."

President Chase, in delivering the annual presidential address, stressed the future of the welding supply business and the problems that today face the welding distributor. He emphasized that there is a need for overhauling our entire thinking in an effort to increase sales.

Without benefit of a crystal ball, James F. Lincoln, well-known president of The Lincoln Electric Co., Cleveland, talked on "Welding and Its Future." Said Mr. Lincoln: "We are creatures of habit. Because of this, we are reluctant to accept better designs, better techniques and better machines than are now used. It is also because of this slavery to habit that there is reluctance on the part of many people to accept welding."

According to this speaker, one of the major problems facing the welding industry, and particularly the welding distributor is to reduce the cost of distribution. Mr. Lincoln was of the opinion that if the customer knew selling costs he would coöperate to the fullest extent to help reduce them.

Following the appointment of resolutions and nominating committees, T. A. Fernley, Jr., advisory secretary of NWSA, discussed a revision of the by-laws. The executive committee has been eliminated and is now succeeded by a board of directors of fifteen members. Five directors will be elected every year to serve a three-year term.

Wednesday afternoon was taken up with a visit to the Armco Steel Corp. plant at Middletown, O. Ladies attending the convention were invited to a luncheon and card party at the Cincinnati Club. Also scheduled for the ladies on the following day was a sight-seeing tour of Cincinnati with optional visits to radio stations, art museums and department stores.

PLAN 1950 EXHIBIT

Thursday morning sessions were opened by R. S. Mars, the senior vice-president of the association. Advisory Secretary T. A. Fernley, Jr., gave a report on the activities of the association during the past year and reported also on the activities of a special committee on exhibits. This committee recommended that exhibit space be made available to association members for the 1950 meeting. It is tentatively planned to have only sales literature in the booths, which would be open from 2 to 6 p. m. during the first two afternoons of the 1950 convention.

A gratifying report was delivered by W. R. Boyd, chairman of the membership committee. There are now 150 members, representing a gain of 32 during the past year. Six additional distributors joined the association during the course of the meeting.

An extremely interesting talk on the subject of increasing the wholesale salesman's effectiveness was delivered by Dr. James H. Davis, professor in the College of Commerce and Administration, Ohio State University, Columbus. An abstract of this address appears on page 32.

Selling was also the subject of A. H. Butz, general sales manager, coated abrasives and related products, Minnesota Mining and Manufacturing Co., St. Paul. New selling methods are necessary, opined Mr. Butz, in view of the fact that all industries are now confronted by an aggressive competitive market. The five big problems of today are:

1. New salesmen who know little about selling, or even about the product they are selling, have been placed in the field.

2. Industry has been in a sellers' market for so long it has forgotten how to sell.

3. Plant capacity has been increased to the point where aggressive selling is necessary to keep the machines turning.

4. Having had little need to demonstrate quality in recent years, many manufacturers have forgotten about the meaning of quality as a sales tool.

5. Manufacturers generally have

Meeting

Cincinnati meeting of the National Welding Supply Association

forgotten much about planning for specific territory selling.

Mr. Butz gave a detailed outline of a ten-point plan his company is adopting to overcome these five difficulties of the buyers' market.

Distributor Problems

A session devoted exclusively to the problems of the welding distributor was held on Thursday afternoon under the guidance of Hal Savage, western vice-president of the association. Speakers and their subjects were:

W. A. Rice, sales manager, Virginia Welding Co., Charleston, West Va.: "Advertising budgets and the most effective types of advertising media that can be utilized by the average welding supply distributor."

Allen H. Young, Independent Distributing Co., St. Joseph, Mo.: "What method or methods can be used to determine whether salesmen are paying their way?"

W. J. Bentley, Bentley Sales Co., Milwaukee: "Are the gross margins we are receiving adequate to cover our operating costs?"

Howard Proctor, Acme Welding Supply Co., Houston: "The basis on which we sell the small store which resells replacement parts."

W. F. Johnson, Johnson Welding Equipment Co., Inc., Chicago: "Repairing of welding equipment."

R. P. Tarbell, president, Scott-Tarbell, Inc., Cleveland: "Our experience with a perpetual inventory system."

Standards of Excellence

Gaiety was combined with serious business at the informal dinner held in the ballroom of the Gibson on Thursday evening. Attendance reached the 147 mark. E. C. Caluwaert, of O.K.I. Welding Supply Co., was at his best as toastmaster.

Speaker of the evening was F. W. Giesel, business manager of the Cincinnati *Post,* whose subject was "Standards of Excellence." Mr. Giesel pointed out that we must devise means for measuring these standards and apply them to our schools, politics, business, citizenship, to the individual worker and to the government. Politics, Mr. Giesel was of the opinion, could be raised to undreamed heights of honesty and efficiency by three simple provisions: (1) No candidate should be eligible for re-election. (2) Office holders should be paid sufficiently well to remove the temptation to be dishonest. (3) Candidates should not be allowed to seek election on any plan for providing "security" to the people.

As far as citizens are concerned, Mr. Giesel would like to see all voters qualified by an intelligence test.

Final Business

Friday morning sessions were opened by W. J. Bentley, a member of the board of trustees. James N. Alcock, Saginaw Welding Supply, read a memorial prepared by T. B. Jefferson, editor of The Welding Engineer, for members of the association who had passed away since the last convention. A severe loss was felt in the deaths of L. O. ("Heinie") Schneiderwind, A. H. Homrighaus, Sr., H. W. Sweet and V. S. Rice.

Five more papers were given. "Our method of compensating salesmen" was the subject allotted to J. W. Albiston, Maine Oxyacetylene Supply Co., Auburn, Maine. J. W. Richards, Welder Sales and Service, Youngstown, O., discussed "Quality control and its effect on the cost of doing business." Randy Allen substituted for E. A. Steidl, sales manager, welding electrode and equipment division, A. O. Smith Corp., Milwaukee, in presenting a paper on "Effective use of manufacturers' sales literature."

Roy Poe, Tweco Products Co., Wichita, Kans., made a splendid inspirational talk on the fundamentals of selling, gist of which was the great need that exists today for more aggressive action and better follow-up in sales effort. Hal Savage, of Arizona Welding Equipment Co., closed the formal discussions with a talk on the value of incentive bonuses for inside employees.

HAL SAVAGE, of Phoenix, Ariz., was elected senior vice-president

New officers were installed, and the meeting adjourned until the 1950 annual NWSA meeting in Chicago.

New Officers

R. S. Mars, of W. P. & R. S. Mars Co., Duluth, Minn., was elected president for the coming year. Hal Savage, Arizona Welding Equipment Co., Phoenix, Ariz., was elected senior vice-president.

Other vice-presidents are: R. S. McCracken, Jr., of R. S. McCracken & Sons, Inc., Philadelphia; E. C. Caluwaert, O.K.I. Welding Supply Co., Cincinnati; R. P. McMillan, Southern Oxygen Co., Inc., Washington, D. C.; F. P. Kohlbry, Machinery & Welder Corp., St. Louis; H. R. Proctor, Acme Welding Supply Co., Houston, Tex.

Directors for the terms expiring in 1952 are: R. S. McCracken, Jr., Philadelphia; G. P. Modlish, of G. P. Modlish, Jennings, La.; R. P. McMillan, Southern Oxygen Co., Inc., Washington, D. C.; Howard M. Smith, Jackson Welding Supply Co., Jackson, Mich., and G. M. Sims, Absco Welding Supplies, Los Angeles.

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Do Your Salesmen

Salesmen often earn $17 an hour or more, so they should be selling

BY JAMES H. DAVIS, *Ph.D., Ohio State University*

DURING the past ten years the cost of distribution has increased nine times while the cost of production has increased only three times. As a result, each dollar of the selling price is divided into 41 cents for manufacturing and 59 cents for distribution.

Does this mean that there are too many distributors? No, distributors are essential. Does it mean there are too many competing for sales? No, for competition decides the prices at which products will sell. The answer can be found only in increasing salesmen's effectiveness.

Time Study on Salesmen

I don't know too much about increasing the effectiveness of welding distributor salesmen, but I imagine their selling problems differ very little from those of wholesale drug salesmen. I traveled with and timed 70 drug salesmen during a 72-day period in which we made 576 selling calls resulting in 12,000 sales attempts. I timed these salesmen from the time they left home in the morning until they returned at night. I kept a record of every minute in between, too. Records were made of the time spent in waiting for an interview, the amount of time spent in actual selling, time in checking stock, etc. Records were also kept of the number of items mentioned and the number sold.

How does a typical salesman spend his day?

The country salesman was found to work an average of 10 1/3 hours a day. He was inside customers' stores 6 5/6 hours and outside 3½ hours; of the outside time, 2 1/5 hours, or 21% of the total working day, were spent in traveling. In a typical day, he made 8.3 calls and secured 7.8 interviews. Each of these 7.8 interviews lasted 52.7 minutes.

The city salesman worked a shorter day. He averaged 8¼ hours; 5¼ hours or 64% were spent inside stores. Three hours were spent outside, of which 2 hours were for travel—24% as compared to 21% for the country salesmen. The city salesman took an average of 35.9 minutes per call and made an average of 8.7 calls per day.

How He Spends His Time

In analyzing the country salesman's calls, it was found that of the 52.7 minutes spent in one call, 14 minutes were given to the want book. Promotional selling—checking stock, selling from samples and printed matter—consumes 12 minutes; while 6.8 minutes were spent in other essential activities such as selling the house, adjusting credit and making other adjustments. The largest single factor of a call is the non-essential time—19.9 minutes. Much of this loss, however, is waiting time and consequently unavoidable.

It is interesting to compare the activities of the best and poorest salesman on the basis of days per year (Fig. 1). Our survey showed that the average salesman works 240 days per year. Out of 240 days, the best salesmen spend 41 days on promotional selling; the poorest only 27.8 days. The best spend 70 days in essential work and the poorest 53¼ days. When it comes to waiting, the best salesman spends only 40 days as compared to the poorest salesman's 82 days. The least efficient salesmen spend over one third of their 240 selling days in waiting.

When a salesman works only 41 days a year, he must use those 41 days to the best advantage. Figured on the basis of productive days, a salesman hired at $5,700 a year is being paid at the rate of $17 per hour for his effective selling time. When you pay anyone $17 per hour for doing a job, you had better be sure that he works effectively.

More Arguments, More Sales

The ideal way to increase a salesman's output is to increase his selling effectiveness. We found that for every two times a genuine sales argument was made, one sale resulted. On the other hand, eight items had to be mentioned in a routine fashion before a sale was made. The most effective sales approach was to point out the need for an item to complete the stock; this resulted in a sale in better than two out of every three mentions. It is noticeable that three other arguments used (Fig. 2) produced nearly as good results; saleability 56% success, availability 55% and profitability 51%.

To check on the selling effectiveness of methods used by salesmen, we surveyed this subject under five headings: Does the salesman ask about stock; sell from samples; sell from printed material and samples, sell without sales material. In the average sales call, the average salesman mentioned 18.6 items, using different arguments and methods. He successfully sold the customer an average of 3.8 items or 20.4% of the items mentioned. The average value of sales per call was $40.30, taking 11 minutes of actual selling time.

A detailed breakdown of these sales methods is given in Table 1. This survey would indicate that if you are seeking a high dollar volume, you can sell a large number of items by asking about stock or showing printed matter.

More Time, More Sales

Sales can be increased by increasing the number of items mentioned. The salesman who mentioned less than 10 items per call sold, on an average, only 1.4 of those items. When he mentioned from 30 to 39, he sold 6.5. In the case of 50 or more mentions, 9.4 items were sold. The ratio is roughly 1 sale to 5 mentions.

An increase in selling time will also increase sales. The average call in which less than 5 minutes were spent in selling resulted in $13.10. When between 15 and 20 minutes were spent, $63.40 was sold; increasing the selling time to 30 minutes produced $100 in sales. When you break

Sell?*

when they make their calls

these figures down, you find that each additional selling minute results in a $3.67 increase in sales. Since it has already been shown how stock checking during await-interview time can increase selling time without increasing the amount of time spent with the customer, each of these minutes properly used in stock checking can be worth $3.67.

Sales can be increased. Regardless of whether the approach is through a definite attempt to increase time, a definite attempt to increase the number of items mentioned or a definite attempt to increase the number of genuine sales arguments made, a relatively small increase per call will result in large returns in the increased sales volume at the end of the year.

What Makes a Good Salesman

To summarize, on the very important question of why a good salesman sells more than a poor salesman, we find that:

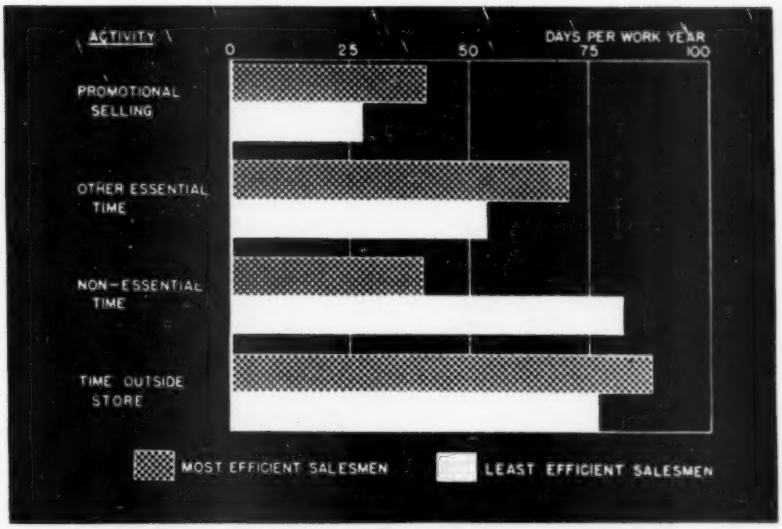
1. A good salesman wastes less time; he is careful about driving time; he doesn't waste time looking for a place to park. He takes his customers to a secluded place for an uninterrupted interview and he finds out in advance about the customers he is going to sell. He wastes less time by doing all of these things.

2. A good salesman spends more time selling—more time in the actual presence of his customer—and has less wasting time. In spending more time with the customer, the good salesman makes more attempts to sell. Remember, he has a chance of selling one out of every five items that he mentions to the customer.

3. A good salesman gives his customer reasons to buy. Each time he gives the customer a good reason, he has a 50-50 chance of a sale.

4. A good salesman dominates the interview. This can be done only when the customer welcomes the salesman. The salesman with a reputation for rendering service is welcome; his time is worth the $17 per hour it costs to send him out.

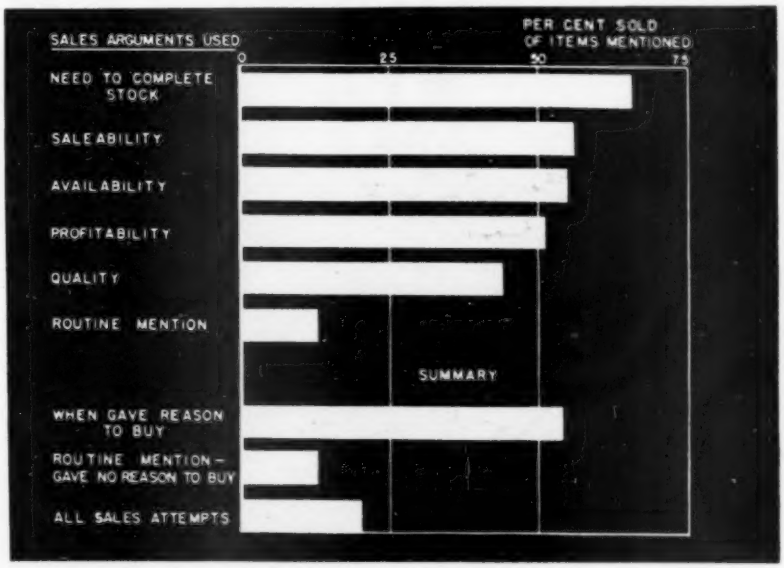
*Based on an extemporaneous talk at the National Welding Supply Association meeting, Cincinnati, May 12, 1949.



1—NUMBER OF DAYS per work year (total 240 days) that the most and least efficient drug company salesmen spend in various sales activities

Table I. Analysis of Sales Methods

	No. of items mentioned	No. of items sold	Percentage of sales to items mentioned	Total value of sales per call	Minutes spent per call
Salesmen asked about stock requirements	11.5	2.2	18.9	$16.50	4.0
Salesmen used samples....	2.1	0.6	30.5	4.60	2.0
Salesmen used printed matter	4.4	0.7	16.3	15.40	4.2
Salesmen used printed matter and samples.....	0.2	0.1	50.0	1.00	0.4
Salesmen used no sales material	0.4	0.2	42.4	2.80	0.4
Total per call.....	18.6	3.8	20.4	$40.30	11.0



2—HOW ARGUMENT used affects sales. Most successful sales argument was "need to complete stock." "Saleability" was also a successful closer

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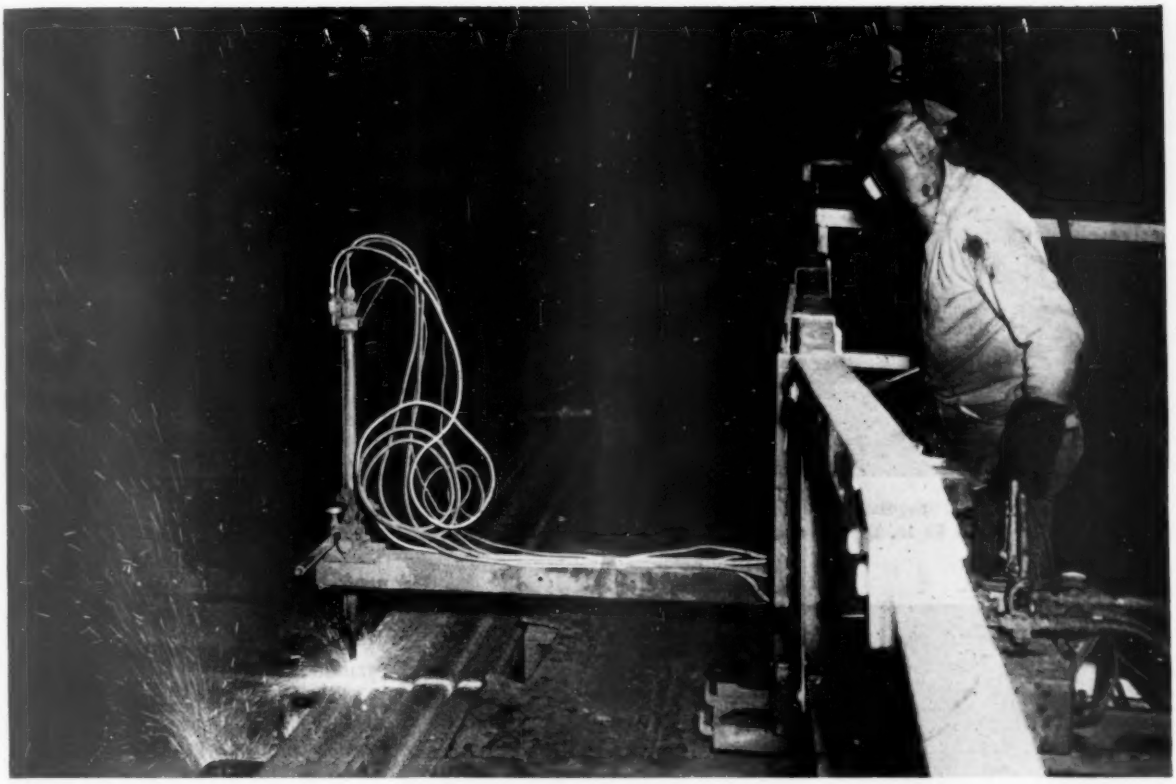
1—OXYGEN LANCE is called on to crop the hot top and bottom stool from a 250-ton ingot, 108 inches in diameter

Heavy C

BY L. P. ELLY
Welding Supervisor,
Bethlehem Steel Co.

GENERALLY speaking, heavy cutting will include material of thicknesses upwards from 12 in. However, there is another basic factor involved: the accuracy tolerance. There are cutting jobs only 8 or 10 in. thick which fall into the heavy cutting category because they require such precision that the working requirements are fully as exacting as on the heaviest materials. Finally, a third category, belonging in many ways in the "heavy" class, is represented by hot cutting on the roll line of billets or slabs in the range upwards from 4 in. square. Though the thickness is moderate, the speed and quantity of work and the operat-

3—SCRAPPING with a heavy-duty cutting machine. Work is carried on cars running across crane runway to extend the working area of scrap yard



2—HEAVY-DUTY TORCH cuts four 4½-in. hot billets at a time. Note the automatic hydraulic stop in the background

y Cutting*

In steel mills, "heavy cutting" is generally anything over 12 in. Some applications are: cropping ingots, cutting billets, cutting scrap, cutting large risers, shaping heavy parts to final contour

ing procedures bring the job parallel with really thick materials.

Uses in a Steel Mill

A large steel mill finds use for heavy cutting in most of its main areas of work. Here are some typical tasks:

In basic production, ingot cropping and roll line cutting.

In finished production, riser cutting; cutting forgings before, during and after forging; shaping for machining or to final contour; shaping parts for special weldments.

In maintenance work, a variety of on-the-spot applications.

In the scrap yard, reducing buttons, spills, skulls, hot tops and scrap ingots to charging-box size.

The torch is used in the above types of work because it saves time or money or else because it does jobs which are otherwise almost impossible. It cuts ingots which cannot be handled efficiently by other methods. It supplements saws and shears to maintain the pace of the roll line. It removes risers faster, cleaner, more safely. It reduces the amount or number of steps in forging and machining—sometimes it eliminates the necessity for contour forging or rough machining. It roughs out complex blanks for a variety of work, particularly in maintenance operations. Finally, it reduces scrap to charging-box size faster and with less handling than any other method.

Today, the torch is the basic tool for heavy cutting. It would not be right, however, to disregard the oxygen lance, which was the first cutting and piercing tool in the steel mill. The lance is still a very useful device. It is no longer a routine production tool for cutting, having been largely replaced by modern heavy-duty torches, but it is a reliable and versatile "spot" method of great utility in thicknesses close to the limit of workability.

Installation Requirements

The steel mill handles a very large volume of work, work that is spread over a large geographic area, a variety of work constantly changing. It requires speed in turning out material of great mass or bulk in many jobs.

To measure up to the above requirements, an installation designed

*Abstract of a paper presented at annual meeting of International Acetylene Association, Pittsburgh, April 25-26, 1949.

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4—SHAPE-CUTTING adapter bit 6 in. thick from a 30 by 30 by 48 in. forged steel block

5—BEVEL CUT through a 17-in. thickness of a machined die block was made at speed of 3 ipm. Cut has excellent quality

8—CUTTING THROUGH 28-in. thickness to separate two forged cranks. Holes shown on top were pierced with the oxygen lance and then torch cut

9—DISC 15-IN. thick was flame-cut to 177-in. diameter with a radius rod

for heavy cutting work must provide:

Ample supplies of gases, well distributed.

Flexible, versatile equipment.

Logical distribution of equipment suited to the work.

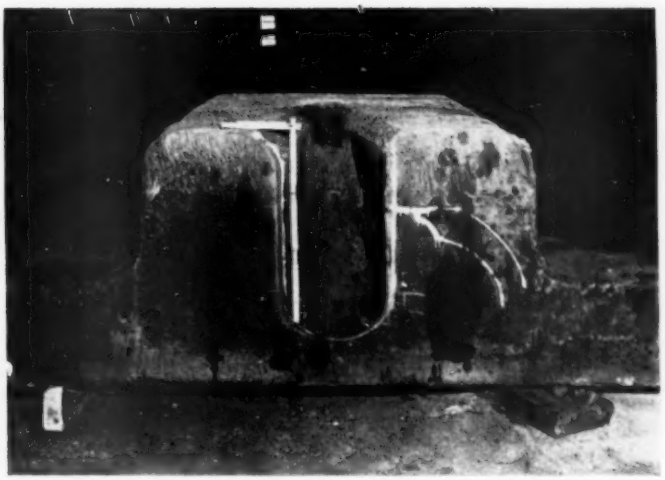
Good operators, well supervised.

Proper templates, safety devices, controls, maintenance and repair facilities, etc.

It is obvious that the gases supplied must be of substantial volume at outlets over a wide area. The supply must be constant, with reserve capacity for exceptional peak demands. In our experience, acetylene requirements in one shop alone—the press forge—average between 600 and 800 cu ft an hour. Scrap cutting will add another 300 to 400 cu ft per hr. With the other operations demanding similar requirements, the total comes to about 3,000 cu ft of acetylene per hour.

As a practical measure, such a supply can only be obtained efficiently with a bank of generators. In a mill where appreciable heavy cutting is added to the scarfing and general oxyacetylene load, three double-rated 500-lb acetylene generators were installed, later supplemented by a fourth unit. The generators are connected by a system of yokes to assure a steady flow from whichever generators are on the line at any given time. The carbide room in the generator house is raised so that the floor is level with the filling platform in the generator room, and the entire building is of fireproof brick construction. With three generators, the capacity

6—CONTOUR CUTTING was done by machine, hand torch and lance to form a rudder stock



7—DIE FOR RUDDER STOCK of Fig. 6 was also shaped by the torch. Block was cut through 24-in., and cavity is 18 in. deep

of this installation was 750,000 cu ft per month, but the addition of an annex to a forge shop soon required the fourth generator.

In the upper level of the generator room, the gas headers are of 2½-in. pipe, the downcomers to the filters are of 1½-in. pipe, and the main supply line is of 3-in. pipe. A typical shop with a heavy gas demand has a scarfing area at one end, a repair and miscellaneous cutting area in the middle and a heavy cutting area at the other end, about 400 ft long all told. In this shop, the oxygen feeder pipe line is 3 in. in diameter, branches 2½ and 2 in., drops 1 in. Main-line oxygen pressure is maintained between 160 and 200 psi; acetylene at 15 psi.

The entire pipe-line system is welded except for an occasional accessory or fitting of special nature. This simplifies erection, prevents leaks and streamlines the flow of gases. To change direction without loss of maximum flow, we have found it advisable to bend the pipe whenever possible. Large pipe sizes and relatively high pressures also help to guarantee the large constant volumes (particularly of oxygen) required for heavy cutting.

Cutting Stations

For a multiple-torch machine of the pantograph type, 2-in. downcomers are used with five oxygen and four acetylene stations. This allows four torches for normal cutting or two heavy cutting torches plus supplies for a hand torch or lance. The arrangement is fairly typical of all large operating stations.

The basic cutting machine in the mill, for both regular and heavy-cutting work, handles either straight or shape work and can be readily moved on its rails to reduce handling operations. In cases where this machine cannot be brought to the work, or the work to it, the largest portable-type machines are used. These semi-portable cutting machines have the capacity to carry the mass of equipment required for heavy cutting and permit an excellent degree of flexibility. The only requirement is that gas supplies be available at the working point, which goes back to the design of a fully satisfactory pipe-line system in the mill.

Torches and Operators

The torches used for heavy cutting are of the heavy-duty type, often water-cooled (especially for roll-line hot cutting) and supplied by three hoses for acetylene, preheat oxygen and cutting oxygen. The torch to be used in a heavy-cutting operation must be carefully selected to meet the requirements of the job, and it is wiser to provide excess capacity than to risk failure by forcing the work with an inefficient or undersized torch. Generally, the tips are of styles designed for heavy cutting, with heavy preheat capacity and large cutting-oxygen orifices. Our experience has been that large volumes, rather than high velocities, of cutting oxygen are the key to successful heavy cutting.

It is probably too much to hope that the ideal type of cutting operator, complete with know-how, experience, technical knowledge and ability to handle the job on his own, will come along very often. The practical approach is development of the best operators possible with the personnel available. As far as personnel is concerned, the important thing in heavy cutting work is to be sure the know-how and experience are available—either in the operator or supervisor, or preferably both.

Even the best supervision will not be enough unless every possible step is taken to train the operator. Experience under the guidance of qualified men, on-the-job learning and formal training can all play important parts. Among the fundamentals, the principles of oxyacetylene safe practices should be thoroughly taught to every man. Those chosen for heavy cutting should be men who have good safety records as well as skill and experience in technique.

The Oxygen Lance

The lance was previously referred to as the oldest cutting and piercing tool in the steel mill, and it is still a useful one. In the early days of heavy cutting, the lance served to supplement the limited penetrating abilities of the torch. In one case dating from the 1920's, two lances were used and also a machine torch on 3-ft-diameter risers. A tolerance of 6 in. was allowed above the finish line. Today, even larger jobs of similar

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nature are torch cut to within 1 in. of the finish line.

The lance can be used alone at times for severance of particularly difficult sections where quality and smoothness of cut are relatively immaterial. Fig. 1 illustrates a case in which the lance was used to crop the hot top and bottom stool from a 250-ton, 108-in. ingot. This job, while it is one of the exceptional cases for which the lance is the logical tool, is not an uncommon kind of thing in steel-mill operations. The lance also continues to function as an important heavy-cutting method in hole piercing and other more routine operations.

The relatively slow and clumsy lance operation draws an interesting contrast with the work in progress in Fig. 2. This is a multiple hot roll-line cutting job on 4½-in. square billets. While the thickness here is hardly to be considered "heavy," the speed and accuracy requirements and the temperature of the steel (about 1,800 F) impose procedure limitations which put it, for practical purposes, in the same class of work. A three-hose set-up is used, with copper tubing replacing the conventional hoses. The heavy-duty torch is mounted on a square hollow bar on a heavy portable-type cutting machine. Remote controls for gases are also on the cutting machine carriage so that everything is at the finger tips of the operator. An automatic stop is operated hydraulically.

Quality can be obtained to a very satisfactory degree. The bevel cuts on the die block illustrated in Fig. 5 are of excellent quality, though not particularly unusual for a good job. These cut were made through 17 in. of a previously machined and finished part at a speed close to 3 ipm. The quality leaves very little to be desired.

As thickness increases, it becomes more and more difficult to obtain such quality. Nevertheless, the cut faces of 35-in. sections of massive forged crosshead slides were well up to any standards for a roughing operation and compared well with their forged top and bottom surfaces.

Shape Cutting 30-In. Block

Fig. 4 shows a shape-cutting operation on a forged steel block 30 by 30 by 48 in. in which quality was an important requirement. The 6-in.-thick reverse-curved section forms an adapter bit, with the bulk of the block winding up as scrap. The cut was made with very short drag and sharp, clean corners through the 30-in. section, after which the ends were shaped by cutting through the 6-in. section. The ratio of scrap to finished part on this job is indicative of the amount of forging or machining work which can sometimes be saved by flame-cutting.

Cranks 28-In. Thick

Another example of the worthwhile savings in machining which can be obtained with the torch is illustrated in Fig. 8. The piece to be cut was a rough forging of alloy steel for two cranks. The cranks were forged as a pair and cut apart through a section 28 to 29 in. thick and about 5 ft long. A hole in each crank was lanced, also through the 28-in. thickness, and roughed to diameter with the torch. The ends were trimmed by cutting through 26-in. thicknesses, and a post on each crank was trimmed by hand cutting to a hexagon to save on rough turning. The forging was normalized and annealed and preheated to 400 F before cutting; afterwards, the cranks were air cooled and drawn.

In a somewhat different way, forging was saved on the rudder stock illustrated in Fig. 6. Special dies with several varying radii in the end of the part would have been required to obtain the desired contour. Until such dies could be made up, a combination of machine flame-cutting, lancing, and manual cutting served satisfactorily to form the rough shape on the rather difficult contours.

The torch was also used in forming the dies which were made up to complete this type of rudder stock by forging. Fig. 7 shows how both the face and the cavity of the forged block were flame-cut—the block through a 24-in. section and the cavity 18 in. deep. This is a tricky and rather unusual type of heavy cutting operation.

A routine heavy cutting operation is the straight-line cutting to size of heavy slabs, forging blocks and ingots. While some of this work is done to ample tolerance, much of it meets dimensional limits which are fairly exacting. Such a case was a 23-in.-square forged ingot, which was cut on both ends to within ¼ in. of its final dimension. Naturally, a quality cut is always required on such close-tolerance work.

The exact opposite is the case when heavy material is scrapped. Here the only objective is speed of severance. On a cut on the 44-in. section of a scrapped ingot, for example, heavy drag, gouging and an uncut corner that had to be finished off with a hand torch were all immaterial as long as severance was obtained with reasonable speed.

Cutting costs in gases and labor must be kept in balance with the savings to be obtained by flame-cutting spills, skulls, ingots and other such heavy pieces. There is a definite way of operating to obtain the best economy. Sometimes the most economical operation is the lance, or a lance and hand torch combination; sometimes a portable cutting machine as in Fig. 3; possibly even a pantograph-type machine can be used most economically. One of the major savings in the cutting of heavy scrap lies in the reduction of handling steps, and it is possible that either manual operations or a shape-cutting machine will contribute much to that end. Another important element in handling is the layout of the scrapping area, which can be greatly improved by well planned facilities. It is possible to reclaim vast quantities of otherwise useless heavy scrap around the mill with the aid of the torch.

Precision Heavy Cutting

It is, however, in precision production work that heavy cutting has made its greatest strides. The case illustrated by Fig. 9 is one of the most outstanding examples of torch assistance in a tough production job. The big disc shown in this picture started out as a forging ingot. It was press forged in one direction toward its circular shape, and the ends were trimmed on a radius to provide handling clearance for cross forging. A riser of surplus metal left in the center was removed with the torch after forging. The disc, then 15 in. thick, was flame-cut to 177-in. diameter, as shown in Fig. 9, and a hole 20½ in. in diameter was cut out in the center. The rough disc was machined to 10½-in. thickness, finish bored and rough turned to diameter. Finally, the part was returned to the cutting-machine table for the cutting

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of four slots. These slots, 3¾ in. wide by 47 in. long, were flame-cut to final dimensions, allowing nothing for finishing. This part represents the ultimate in the integration of forging, machining and flame-cutting.

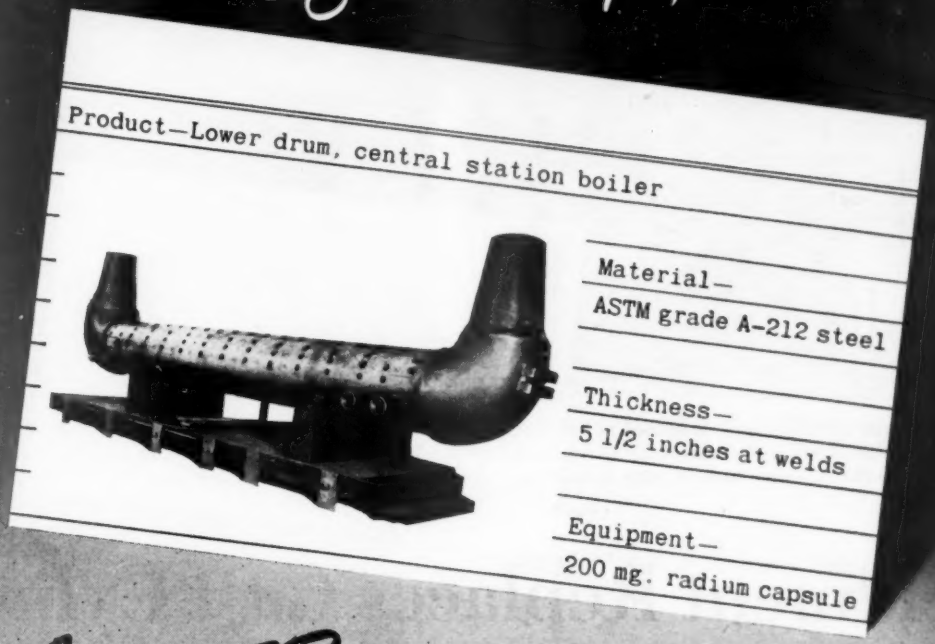
The job also exemplifies the key functions of the torch in the mill. The torch reduced both the amount and the difficulty of forging to produce the rough part. It reduced the amount of machining required to finish the forging, and finally it served as a finishing tool in creating the slots directly to final size. These functions demonstrate the modern position of the torch—its reliability, economy and accuracy in handling heavy material.

The maintenance of cutting facilities and equipment are very nearly as important as their existence. To assure reliability and accuracy, they must be kept in the best possible condition. In a large mill, nothing is as satisfactory as a central repair and maintenance organization, one stocked with spare parts and spare cutting machines and torches and staffed with skilled and experienced specialists. With this system, on-the-spot repair work is minimized. Normal procedure is to overhaul and recondition equipment in the central shop, replacing it with spare units. Good routine maintenance in the shop provides constantly reliable equipment at a minimum effort and expense. Spare parts inventories are reduced, repair work is done better and faster, and the experience and skill for such work is concentrated where it can do the most good.

Forecast for Future

Experience in the last decade has brought flame-cutting to full-grown status for heavy work, yet we may expect to see it go even further in the future. One direction will lead toward more applications of the process for precision work and wider use as a finishing or close-tolerance roughing tool. Another will lead, very likely, toward greater economy of operation in such work as scrapping, with development of procedures for reducing handling operations and gas costs still further. Generally, as realization of the possibilities grow, we may expect to see the torch used more frequently for more operations in the mill.

What's the right X-Ray film?



ANSWER:

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● Here was thickness—thickness that demanded the fastest possible film to keep exposure time down. Gamma radiation was to be used.

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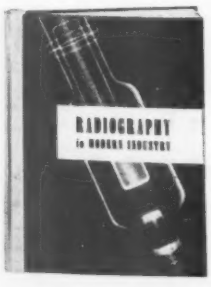

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Type K has medium contrast with high speed. For gamma ray and x-ray work where highest possible speed is needed at available kilovoltage without calcium tungstate screens.

Type M provides maximum radiographic sensitivity, high contrast, and exceptional detail under direct exposure or with lead-foil screens. It has extra fine grain and the speed is adequate for examination of light alloys at average kilovoltage and for much million-volt radiography of steel and heavy alloys.

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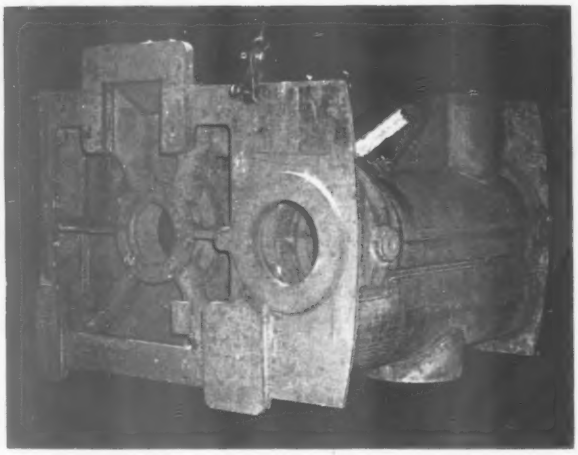
from these

SEVENTY COMPONENTS were required to fabricate a cylinder to replace a cracked casting in a marine engine. This is how the assembly looked prior to welding

came this



COMPLETED WELDMENT (viewed from its base) ready for final machining. Cylinder actually contains two cylinders with connecting ports at the top and bottom

Weldment Replaces Cast Cylinder

A new casting would have meant new patterns, and time was the big factor in returning a vessel to service. Though contrary to precedent, it was decided to fabricate the cylinder from welded plate

BY RAY BLOOMBERG

AN OUT-OF-THE ORDINARY weldment was created by the application of ingenuity and skill at the Everett, Wash., yards of the Everett Pacific Shipbuilding & Dry Dock division of the Pacific Car & Foundry Co.

When the SS *Edward Chambers* was being converted for return to private operation after war service, she was found to have a crack in the first intermediate-pressure cylinder of her quadruple-expansion steam engine. The cylinder was deemed unfit for further service by the American Bureau of Shipping and U. S. Coast Guard inspectors.

Engine Dated from 1909

The engine had been made by the Great Lakes Engineering Co. in 1909, and the original patterns for the cylinder casting had long been destroyed. To avoid the delay of making new patterns for a replacement casting, the Everett shipyard decided to fabricate a cylinder of welded steel plate. This is far from a common procedure, but the management thought it could be done successfully.

First step was to obtain copies of the plans for the original cylinder casting from the maker, and these, fortunately, were available. However, the old blueprints dealt with the cylinder as one integral piece, as is the case with most casting plans. It was necessary to break down the cylinder into component parts that could be formed of steel plate and joined by welding. Hugh McQueen, company draftsman, prepared sketches to show how the cylinder could be fabricated of many component parts yet would continue to duplicate the original cast cylinder in appearance and function.

70 Components Needed

These sketches were submitted to the American Bureau of Shipping, New York City, and to the United States Coast Guard, Washington, D. C. Approval was promptly forthcoming from both offices with only one stipulation: those details not shown were to be included in accordance with the best marine design and workmanship practice.

From McQueen's preliminary sketches, a full-scale layout was made by the company's loftsman. At this time the cylinder was broken down into 70 components, excluding the heads, piston and piston valve. The cylinder, as shown in the above pictures, actually contains two cylinders connected by ports at top and bottom. There is also an exhaust chamber within the valve cylinder.

Use Heavy Plate

Steel selected for the fabrication was of firebox flanging quality in three thicknesses from $\frac{7}{8}$ to $1\frac{1}{2}$ in. The piston cylinder, which has a 37-in. ID, was formed of intermediate $1\frac{1}{4}$-in. plate, and the smaller cylinder and exhaust chamber utilized the comparatively light $\frac{7}{8}$-in.

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plate. The heavy 1½-in. plate was reserved for the base, top, gussets, bolting pads, etc.

The plate weight was probably excessive in view of the stresses to be encountered under normal conditions of service. However, the heavy plating permitted more rigid subassemblies and minimized distortion, which, obviously, would have been greater had lighter plating been employed.

Bore Oversize for Liners

To maintain the original piston diameter, it was necessary to have in the cylinder bores an oversize ID that would permit the insertion of cast-iron liners in both the piston chamber and the valve seats in the valve chamber. Since the valve is of a piston type, the insertion of internal rings in its cylinder was required, two each at top and bottom. Their bore was telescopic; that is, the lowest ring had the smallest diameter and each ring above progressively increased in diameter. This procedure was followed so that the cast-iron liners forming valve seats and resting on each ring could be inserted from the top, inasmuch as there was no other access and a press fit was desired.

Conventional welding techniques were employed with regard to types of joint and sequence. Maximum run-out in the cylinder was less than 3/16 in., while overall height and width of the assembly were exact. The run-out did not constitute any particular problem, according to Klark Kruse, welding foreman, as more than sufficient stock remained for internal boring and external facing.

Welds Stress Relieved

Stress relieving was done after fabrication and before the foundations and bolting pads of the weldment were faced and the cylinders bored to size. The liners were then dressed and pressed into the cylinders, and the fabricated covers were fitted. After the job had been "buttoned up," trials and tests were conducted to the complete satisfaction of all concerned. The vessel was turned over to her operators well in advance of the time which would have normally been required for a job of this magnitude.

30 YEARS AGO

(From THE WELDING ENGINEER of July, 1919)

WARTIME experience as a oxyacetylene weldor with the 19th Railway Shop Regiment, A.E.F., in France are related in this month's issue by Robert B. Dyar, of the Davis-Bournonville Co. Mr. Dyar was stationed near Rouen, at Sotterville, in a large railway repair depot. Entire equipment at one of the two welding shops there consisted of a dilapidated water-to-carbide acetylene generator, two ancient torches, three old oxygen regulators, spectacle-like goggles, and a few welding rods.

— 30 YEARS AGO —

SHIP parts that have been approved for arc welding by Lloyds and the American Bureau of Ships are listed in a article by M. J. O'Connell. The a-c welders are more portable for shipyard use than d-c equipment, Mr. O'Connell writes, weighing only 200 lb for 150 amp, while d-c welders weigh 3,000 lb.

— 30 YEARS AGO —

ALL-WELDED boiler fire boxes display many advantages over those made with riveted construction, writes B. K. Smith, United States Welding Co., in a feature article. Mill scale in the riveted lap joint does not conduct heat properly so that the steel in this area crystallizes and cracks from the rivet hole to the edge. Butt welded steel plates allow the water to protect the sheet on its entire surface, and eliminate fire cracks, steam burnt plates and corking operations to repair such failures.

— 30 YEARS AGO —

ATTENTION to the attractive advertising displays of welding manufacturers is invited by the editor of THE WELDING ENGINEER. Welding advertisers were formerly satisfied with keeping their firm names before the public, but have now begun using their ads as educational devices to tell specific uses and advantages of their particular products. Copy is now being changed every month by some advertisers whereas ten years ago it was thought pointless.

— 30 YEARS AGO —

REPORTS have come in to THE WELDING ENGINEER of welding shops who are filling empty acetylene cylinders with oxygen. Many explosions causing death and disfigurement have resulted from doing this, but some people are apparently carrying on with the dangerous practice.

— 30 YEARS AGO —

WELDING goggles are always necessary when using the oxyacetylene flame, writes Professor Koppins of the University of Chicago, in a new government pamphlet on eye protection.

— 30 YEARS AGO —

PASCHALL OXYGEN CO., Philadelphia, has 1,000 Levin cells in operation for making oxygen. It is thought to be the largest unit-type cell plant in the world.

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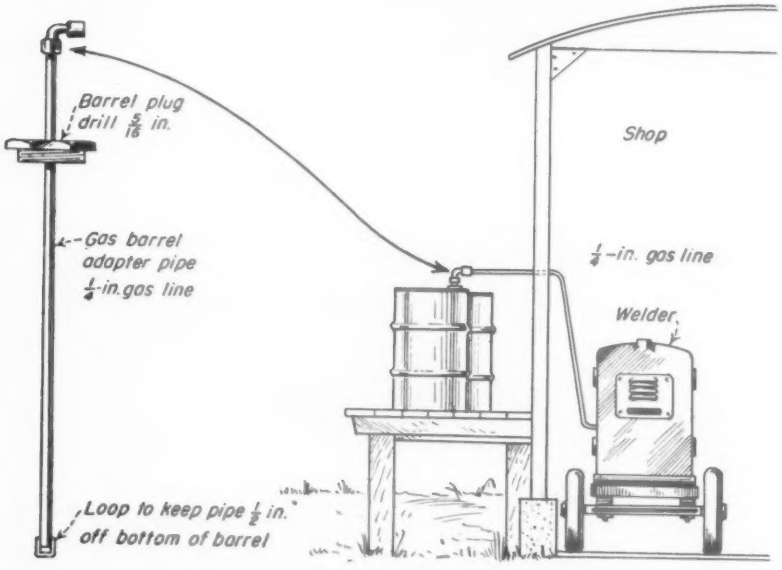
Short Cuts and Kinks



PLATFORM OUTSIDE SHOP holds two barrels of gasoline to operate engine-driven d-c welder

Outside Gasoline Supply

By Ernest J. Morris

AFTER several years of acting as a valet to a gas-engine-driven welder (which we keep inside during our severe winter weather), I decided to call a halt to carrying gasoline. First, we built an outside platform to hold two barrels of gasoline. Then a ¼-in. gasoline pipe line was run through the wall of the shop as shown in the enclosed sketch, saving labor and eliminating the hazard that is always present when open gasoline pails and funnels are used in a closed building. The idea can be adapted by anyone using an engine-driven welder equipped with a fuel pump. If welder is not so equipped, one of the electric pumps sold for Fords and other cars might be adapted. Possibly more favorable fire insurance rates could be obtained under this set-up.

Note: Place barrels so as to avoid drip from eaves. Also have an air leak so you won't build up a vacuum in the drum to stop the flow of gasoline.

* * *

Parts Prebent for Welding

USE of counterstress or prebending to balance the warpage caused by welding eliminates the need for straightening welded parts at the Frank G. Hough Co., Libertyville, Ill., according to T. Seals, welding foreman. Special fixtures designed to make the greater portion of the work flat-position welding have also helped to increase production.

* * *

Welds a Curved Seam

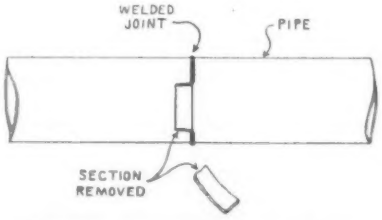
A MIDWESTERN manufacturer uses a track-mounted submerged-melt welding head to weld a curved seam on the front surface of a hot-air furnace. The welding head is left free to swing, but a restraining spring holds the guide wheel against the curved front section and thus keeps the welding wire in proper alignment with the seam.

Welding speed for this application is approximately 46 ipm. Special fixtures were made so that the round top and the vertical side seams could also be welded by the submerged-melt process.

Courtesy The Linde Air Products Co.

SPRING-LOADED submerged-melt head welds curved surface of a hot-air furnace

* * *



REMOVAL of section enabled pipe joint against brick wall to be welded from inside

Welding Next to Wall

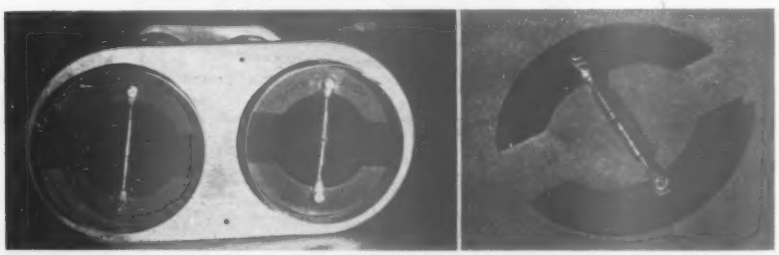
By Thomas Trail

IN JOINING two sections of large pipe by welding, the problem arose of doing the seemingly impossible. This was to weld the part of the joint that was close against a brick wall. We did it very simply, as shown in the accompanying sketch, by flame-cutting a section from the front surface of the pipe to allow the rear seam to be welded from inside the pipe. The removed section was then welded back.

* * *

Expansion Clamps

THE turnbuckle expansion clamp devised by Perry Borgie, Lockheed Aircraft Corp., Burbank, Calif., expands a rolled sheet and holds it for spot welding to surrounding frame. Wooden discs were used in the past, but Mr. Borgie's improvement gives superior assembly in less than half the time originally needed to complete the welding procedure. The expansion clamp is merely two pieces of 3/16-in. plate, flame-cut from arcs of a circle and held together by an aircraft cable turnbuckle.



CYLINDER of rolled sheet metal is expanded and held for spot welding by turnbuckle clamps

How Many Lineal Feet in that Coil of Hose or Welding Cable?

BY W. F. SCHAPHORST, M.E.

MANY materials come in coils these days—welding cable, hose, lead pipe, flexible tubing, wire, rope, etc., to name only a few of them. Frequently, you may desire to know the number of lineal feet that a coil contains. Is it necessary to uncoil it and carefully measure off lengths with a yardstick? Not when there is an easier way.

The chart reproduced at right will be found very useful for finding the length in feet of any coiled material, provided that the "average diameter" of the coil can be ascertained and that the number of turns it contains can be counted. How to measure the "average diameter" is depicted by the small sketch in the upper right-hand corner. Or you can arrive at it very accurately by measuring the inside and outside diameters of the coil, adding them together and dividing the sum by two.

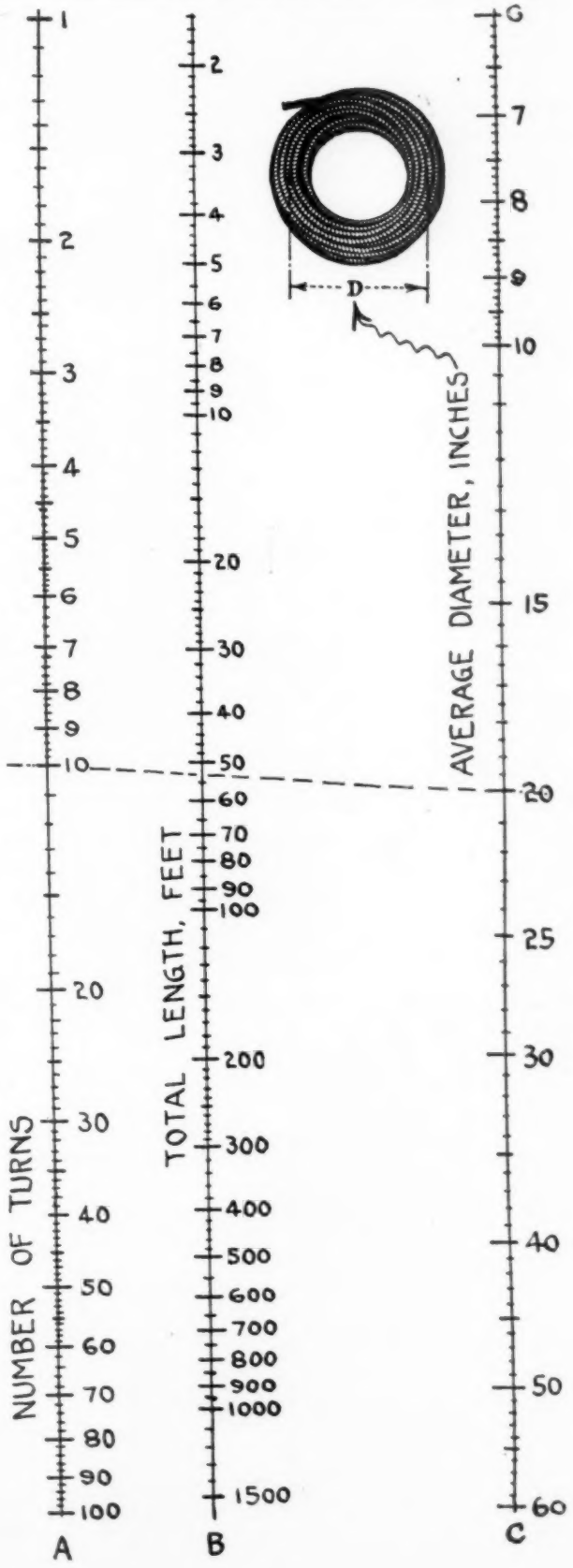
After you have counted the number of turns and measured the average diameter, you are ready to use the chart. Simply lay a straight-edge or draw a line between the points representing the number of turns, as found in column A, and the average diameter in inches, as found in column C. The total length of the material in feet will then be found at the intersection with column B of the straight-edge or line you have drawn.

As a practical example, let us find the number of feet in a coil of cable having an average diameter of 20 inches. Assume that there are 10 turns. The dotted line in the chart connects the 10 in column A with the 20 in column C. The answer, 53 feet, is read in column B. Note that all three columns, A, B and C, increase in value as you go downward.

As will also be noted, the range of the chart is sufficiently great to take care of most of the conditions encountered in regular everyday practice.

The chart may be used "backwards" as well as in the ordinary manner. A "backwards problem" is one where you know the length but want to know the number of turns to take in making a coil. Suppose, for example, that you want to take along 300 ft of rope on a job, and you want to be sure that you will have that much without the trouble of measuring it off. Simply lay a straight-edge across the 300 mark on scale B and rotate it as the number of turns grows. In this way you can easily tell how large your coil should be in order to obtain the required 300 feet.

Paste the chart on a card and hang it in a convenient place. You will find it comes in handy every once in a while.



VICTOR Weld
TYPE VW-83
A.W.S. SPEC.
CLASS
SIZE 1" 8
Standard Package: 25 lbs. net
VICTOR EQUIPMENT CO. · CHICAGO · SAN FRANCISCO
VICTOR Weld
STAINLESS STEEL
ELECTRODES TYPE VW-1347
A.W.S. SPEC. CLASS E 347-15
Typical Deposit Analysis:
C 0.07%
Cr 19.00%
. . . . . 9.00%
A.I.S.I. TYPE 347
Lime Coating
SIZE 3" 32
VICTOR Weld
FOR: Mild Steel—All Positions
Current: Straight, A-C
VW-20
VICTOR Weld
FOR: High Quality Welds in All Positions. For Lap and Edge Welding. Deep Penetration.
Current: A-C or Reverse
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A.W.S. SPEC. CLASS E6011
Standard Package: 50 lbs. net
VICTOR Weld
VW-25
E6013
3" 32
VICTOR Weld
FOR: Machinable Welds on Cast Iron. Cored Commercially Pure Nickel. Eliminate Hard Zone.
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CLASS
Standard Package: 25 lbs. net
VICTOR Weld
FOR: Deep Penetration and High Welding Speeds. Pressure Vessels and Structural Steel.
Current: Straight, D-C or A-C
TYPE VW-24
A.W.S. SPEC
CLASS
VICTOR EQUIPMENT CO. · CHICAGO
VICTOR Weld
FOR: All Position Welding Copper Alloy 95% Copper Joining Mild Iron.
Current D-C.
Chemical Analysis:
per 98.95.8%
phor 4.10-5%
. . . . . .008-.010%
TYPE VW-70
A.W.S. SPEC.
CLASS
1"
VICTOR Weld
FOR: General Purpose ing of Mild Steel ble Arc. High ity. Excellent pearance.
Current: A-C or Polarity.
TYPE VW-28
A.W.S. SPEC.
CLASS E6012
1" 8
VICTOR Weld
FOR: Fabrication of Armor Plate and High Tensile Steels of High Hardenability with A-C or D-C Low Hydrogen Covering All Positions.
Current: A-C or D-C Reverse Polarity.
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A.W.S. SPEC.
CLASS
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Standard Package: 50 lbs. net
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VICTOR Weld
FOR: All Position Welds on A.I.S.I. Types 301, 302, 303, 304 and 308 Steels.
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Standard Package 25 lbs. net
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A.W.S. SPEC.
CLASS E 308-15
SIZE 5" 32
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VICTOR Weld
FOR: Hard Surfacing Against Impact and Abrasion Wear. Deposit Work Hardens. All Positions.
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TYPE VW-94
A.W.S. SPEC.
CLASS
1"
SIZE 8
LOS ANGELES
VICTOR Weld
FOR: High Temperature Pressure Piping of Moly Steel. Also tion Welding Low High Tensile Steels.
Current: A-C or Reverse
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A.W.S. SPEC.
CLASS E7011
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SIZE 5" 32
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HEADS IN A HURRY!

FLANGED and DISHED HEADS, STANDARD and ASME, ON HAND, READY TO SHIP

Lukens has many sizes of Standard and ASME Flanged and Dished Heads in stock, ready to ship to you. Hundreds of dies are available for making other styles and sizes, enabling us to ship the heads you need within a short time after your order is received.

Lukens makes heads 4 inches in diameter to over 20 feet; thicknesses up to 6½ inches; of any commercial metal—carbon and alloy steels, including stainless, non-ferrous metals and the widest range of clad steels available anywhere. 3,898 standard Heads are described in Lukens Catalog No. 1.

You should have this list of LUKENS STOCK HEADS

It shows the sizes and gages of carbon steel heads regularly stocked at Lukens. Ask for Bulletin 433.

Wire or telephone Lukens, giving diameters, gages, styles and materials, if you're needing heads in a hurry. Lukens Steel Company, 416 Lukens Building, Coatesville, Pennsylvania.

LUKENS HEADS

"Head Work", a 16mm motion picture in sound and color, on spinning and pressing of Lukens Heads is available without charge. Running time: 27 minutes. Write for a booking date.

FOUR INCHES TO OVER TWENTY FEET IN DIAMETER

New Products to Use

LOW HEAT welding down to 7 amp, inert-arc welding and regular transformer welding performed with new Hobart a-c welder

Low Heat Control on Welder

THREE separate types of operation are possible with the new Hobart TIH-200-S a-c welder. It can be used as an ordinary transformer type welder; as an inert-arc welder if special controls are switched on, or for extremely low heat operations.

The supplementary low heat control is made possible by a secondary reactor controlled by a hand wheel located on the side of the case. It is easily switched on and off. It is said to make possible effective welding current as low as 7 amp. HOBART BROTHERS Co., Troy, O.

* * *

700-AMP operation with ⅝-in. electrode leaves heavy-duty holder cool to hand

Heavy-Duty Electrode Holder

OPERATING at 600-700 amp with ⅝-in. electrodes, the new Martin Wells heavy-duty No. 6S-6 holder is said to remain cool while welding. A user claims he welded 36 E-6020 ⅝-in. electrodes at 725 amp and that the holder could be held in his bare hands at all times.

Silver-brazed cable connections and size 3/0 cable are recommended for use with this holder. Electrodes are held and fixed in a 60-deg position by cam action. The contact on the rod prevents overheating of the electrode stub and reduces heating of the holder. Quick loading and unloading of electrode is claimed.

Length is 12½ in., weight 32 oz. MARTIN WELLS, INC., 5886 Compton Ave., Los Angeles 1.

* * *

VENTILATED welding cabinet has adjustable table, electrode racks and tool shelves.

Welding Cabinet

COMBINATION welding table and fume collector has many advantages for small bench work. Standard cabinet size is 36 by 28 in. deep with a 70 in. overall height. The table height is adjustable from 30 to 36 in. above the floor. Table rotates and may be locked in horizontal or tilted position.

Controlled ventilation of the cabinet is achieved by adjustable louvered exhaust ports. An individual fan connected to a 1/3 hp motor can be furnished or several cabinets can be connected to a multiple piping system.

Four-pocket electrode rack is mounted on left front of cabinet. Tool storage shelves, insulated hangar for electrode holder and powerful spotlights are other features. RUEMELIN MFG. Co., 3860 N. Palmer St., Milwaukee 12.

* * *

PLASTIC nylon eye-cups for strength and impact resistance protect welder's eyes

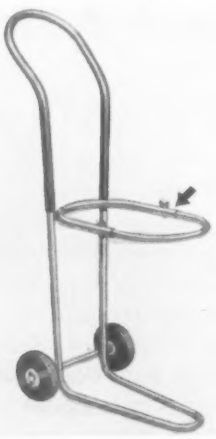
Welding Goggles

NYLON eye cups having more strength and less weight are featured on new welding goggles. Nylon in plastic form has great compressive strength and impact resistance, qualities needed for greater eye protection.

Comfort features include rolled edges to reduce pressure around the eye socket, adjustable leather bridge and headband, exclusive triangular lenses for wide vision and screened indirect ventilating ports, which admit sufficient air to prevent fogging but keep out flying particles.

For chipping and similar work, this goggle is also available with direct ventilating ports and clear, impact-resisting lenses. WILLSON PRODUCTS CO., Reading, Pa.

* * *



TELESCOPIC tubing on the front of cylinder trucks holds standard or small cylinders

Small Cylinder Truck

ADJUSTABLE bracket of telescopic tubing is provided on the front of a new lightweight cylinder truck to hold either standard-size or small cylinders. Truck construction is all-welded. Mechanical rubber tires and oilless bronze bearings enable easy handling.

Manufacturer states that the "Burdox Junior" has a balanced design that enables it to handle heavy loads with minimum effort. THE BURDETT OXYGEN CO., 3300 Lakeside Ave., Cleveland 14.

* * *

Electrode Rack

A VARIETY of rods for welding cast iron, steel, bronze, copper or aluminum are stocked in the new "Eutec-Wall-Pack." This handy steel cabinet is built for wall mounting and measures 22 by 13 by 3 in.; it holds from seven to nine different types of rod or electrodes. Assortments for gas welding, arc welding or gas and arc welding are available for the cabinet. For each welding rod, the proper "Eutector Flux" is furnished. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

* * *

Bender Stand

SHELVES built into a new "Di-Acro" bender stand provide storage for the various bending mandrels used with the "Di-Acro" bending machine. Of welded steel construction, the stand, or cabinet, measures 15 by 15 by 34 in. and net weight is 90 lb. O'NEIL-IRWIN MFG. CO., Lake City, Minn.

WATER-COOLED inert-arc holder of 200-amp capacity is welding an aluminum stand

Inert-Arc Holders

FIVE new manual welding inert-arc electrode holders and one machine inert-arc holder have been developed for use with 100 to 800 amp currents. Manual holders are available in 100, 200, 400 and 800 amp ratings and machine holder in 400 and 800 amp ratings.

The 100-amp air-cooled manual holder has spring-type collets, metal nozzle and gas-tight, heat-resistant gasket. The 200 and 400 amp water-cooled models have split-copper collets, ceramic nozzles, and heat-resistant gaskets. An integral water-cooled nozzle is built on the 400-amp model, which is furnished with tips of two orifice diameters. An 800-amp model has one electrode assembly for each size listed and three water-cooled metal nozzles; one for 5/16 and ⅜ in. electrodes, one for 7/16 in. electrodes and one for ½ in. electrodes.

The 400-amp machine welding holder comes furnished with one piece of each size of tungsten and one set of collets for each size. With this holder and the 800-amp machine, the electrode may be adjusted while welding, and both electrode and collets may be changed without removing the nozzle. The 800-amp water-cooled holder includes an electrode assembly and nozzle for each size of electrode.

* * *

Swivel-Type R-W Electrode

SUBSTANTIAL improvement in performance of a new Mallory swivel-type resistance welding electrode is claimed because cooling water is brought directly in contact with the swivel head. The water hole is drilled completely through the shank.

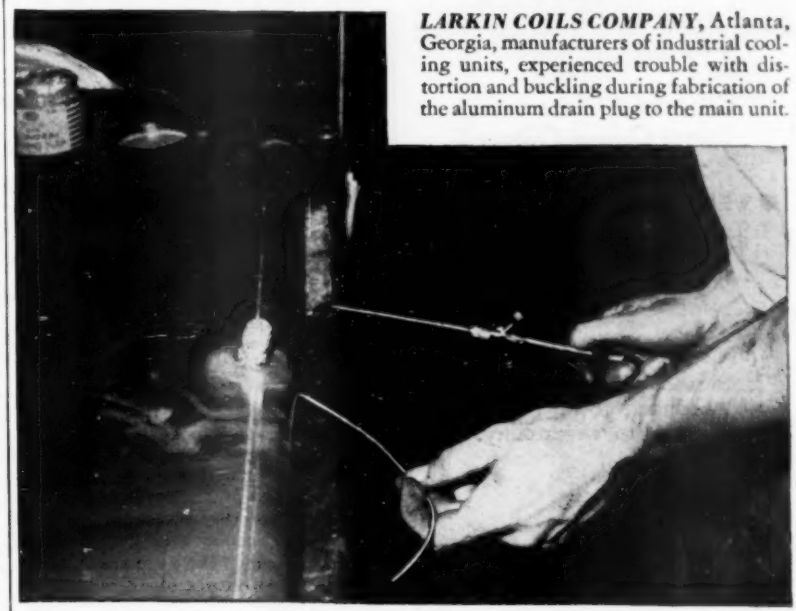
Tests indicate a stabilized operating temperature of 94 C for the new electrode, compared with 332 C for the early design. This temperature reduction is said to materially increase the life of the swivel tip and enable it to produce more sound welds of a higher strength. P. R. MALLORY & CO., INC., Indianapolis, Ind.

* * *

Buffing Machine

FOUR new single-spindle, semi-automatic polishing and buffing machines are offered to increase production of such parts as pots, pans, lamp bodies, hub caps, etc. Two models have single rotating spindles and two rotating stroke type spindles. HAMMOND MACHINERY BUILDERS, 1648 Douglas Ave., Kalamazoo, Mich.

Aluminum Brazing "ups" production 50%...buckling and distortion eliminated



LARKIN COILS COMPANY, Atlanta, Georgia, manufacturers of industrial cooling units, experienced trouble with distortion and buckling during fabrication of the aluminum drain plug to the main unit.

J. P. Flood and R. P. McCleskey, Airco Technical Sales Representatives, recommended aluminum brazing the drain plug to the unit, using Airco No. 716 Aluminum Brazing Wire and Elite Brazing Flux.

The company followed this suggestion, and found that the speed of the brazing technique increased production over 50%. More important, distortion and buckling was completely overcome — finished welds were excellent, rejects virtually eliminated, and savings were effected in gas and filler wire consumption. The company was extremely pleased with these results.

• • • •

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS
To assure its customers of high efficiency in all applications of the oxyacetylene flame or electric arc, Air Reduction has available the broad, practical experience of its nationwide Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Ask about this Airco "Plus-Value" service today. Write your nearest Airco office. (In Texas: Magnolia Airco Gas Products Company . . . On West Coast: Air Reduction Pacific Company.)

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AVAILABLE ONLY IN TAYLOR-WINFIELD
Production Proved
WELDERS

Balanced 3-Phase Input
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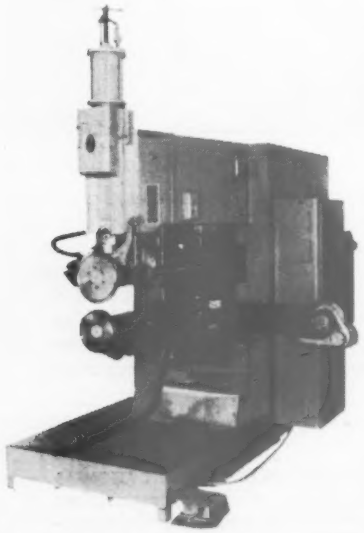
● WELDS FASTER and BETTER

STEEL	STAINLESS
ALUMINUM	MAGNESIUM
MONEL	INCONEL

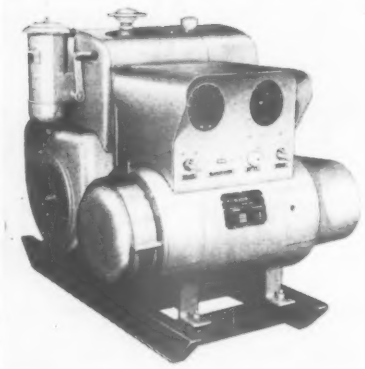
BRASS ALLOYS

Increased production comes with reduced power demand and improved weldability.



THE TAYLOR-WINFIELD CORPORATION
WARREN, OHIO, U. S. A.

TAYLOR-WINFIELD
RESISTANCE WELDERS



ENGINE DRIVEN Miller a-c welder has current range from 15 to 300 amp. Companion d-c line has current range of 30 to 400 amp

Arc Welders

NEW line of a-c and d-c welders is being manufactured by Miller Electric in both engine and motor-driven units. Both a-c and d-c welders have dual controls, separate excitation, instantaneous voltage recovery and easy arc starting. Built-in high-frequency for inert arc welding is available with the engine-driven a-c machines, models AEA-250 and AEL-250.

Wisconsin four-cylinder air-cooled or LeRoi four cylinder liquid-cooled engines power both a-c and d-c engine-driven models. A Miller squirrel-cage motor with cast aluminum rotor, operating on either 220 or 440 volts, powers the a-c and d-c motor-driven welders.

For portability the engine-driven models can be mounted on the Miller RT-10 road towing trailer. Motor driven models are available with either stationary bases or steel-wheeled running gear.

Current range of the a-c welders is from 15 to 300 amp. Range of d-c machines is 30 to 400 amp.

Another recent addition to the Miller line is a 200-amp a-c machine driven by a two-cylinder air-cooled engine. Called the model AEA-200, it may be used with a-c or d-c electrodes up to 3/16 in. diameter. MILLER ELECTRIC MFG. CO., Appleton, Wis.

* * *

Welding Flux

RESTORATION of strength and toughness to heated areas adjoining welded or brazed joints is claimed for "Master" flux and metal conditioner.

Flux is said to work at all temperatures on brass, steel, cast iron, black cast and galvanized steel. It is applied to the heated metal before welding or brazing is started. Postheated metal treated with this conditioner will not be brittle or apt to break, maker claims.

MASTER LABORATORIES, 1545 North Artesian Ave., Chicago.

* * *

Shear

FOR cutting off bandsaw blades square and flat in preparation for butt welding, a new cam and lever-actuated shear replaces metal cutting snips. A piece of blade ⅛-in. wide is removed so that an old weld can be cut out. Shear blades are removable and may be ground. THE DOALL Co., 254 N. Laurel Ave., Des Plaines, Ill.

"Don't Gamble!"

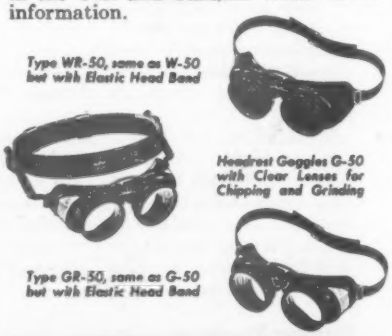
Eye injuries amount to about one-third of industrial accidents. Yet with proper precautions 90% of these can be prevented. All too many seem to be gambling on their good luck—and with disastrous results. Far better to follow the recommendations of safety experts and choose the right protection for each job.

For Gas Welding, Cutting, and Brazing, Jackson Headrest Goggles type W-50 are light and easy to wear, with or without prescription glasses, are simple and easy to adjust, easy to raise and lower.

Goggle assembly is hinged from headrest with telescopic arms, held gently against the face by concealed springs. Spring clips hold arms to headrest to provide added adjustment and easy replacement. Headrest of light, easy to clean plastic, adjustable for size.

Plastic eye cups easily fitted to the face. Outside of each cup has ventilating screen to prevent fogging and baffle plate to keep flying particles and light rays out. 50 mm. glass lenses are available in standard shades from 3 through 6, and have cover glasses to protect them.

Sold only by distributors and dealers in the U.S. and Canada. Write us for information.



Type WR-50, same as W-50 but with Elastic Head Band

Headrest Goggles G-50 with Clear Lenses for Chipping and Grinding

Type GR-50, same as G-50 but with Elastic Head Band

SAFETY GOGGLES • SPECTACLES • EYESHIELDS

JACKSON
PRODUCTS
WARREN • MICHIGAN

ARCOS QUALITY CONTROLS

yield dividends in stainless welds

Viscosity Test

Every Arcos electrode is the product of careful testing and retesting during development, followed by the close adherence to specification for raw materials, and very strict application of quality controls in manufacturing.

THAT IS WHY Arcos electrodes, in the hands of a competent welder, give consistently sound, trouble-free welds.

THAT IS WHY Arcos electrodes deposit weld metal physically, chemically and metallurgically right for the job at hand.

THAT IS WHY every day of welding with Arcos electrodes *yields maximum production*. Costly non-productive time, chipping and rewelding or repairing weld failures is eliminated.

These are the reasons why the pound price of Arcos electrodes is not a true measure of the value of the welds developed from them.

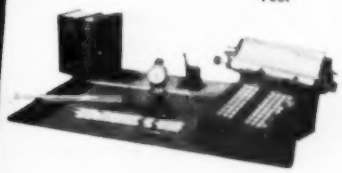
•

Use Arcos quality controlled stainless electrodes to keep your weld costs low.

•

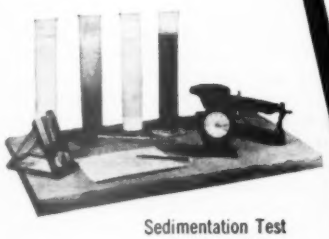
Bulk Test for Coating Materials

Ferro-Alloy Gassing Test

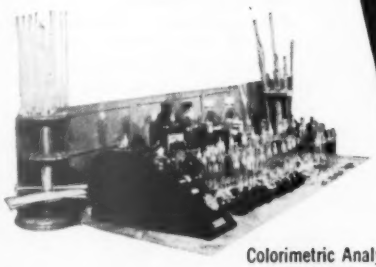


Eccentricity Test

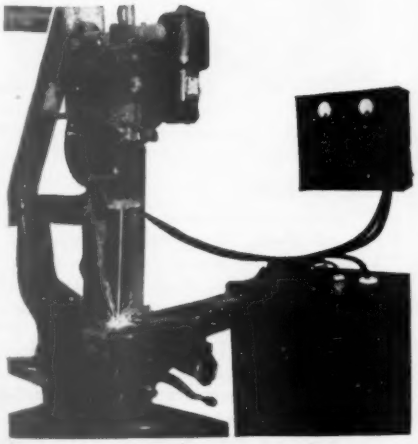
Screen Test for Particle Size



Sedimentation Test for Particle Size



Colorimetric Analysis of Steels



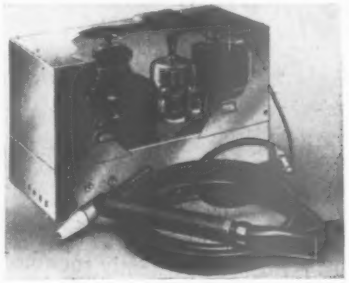
Automatic Welding Machine

ELECTRODES • COILED WIRE • BARE ROD •

END Interference TROUBLES

—Use FCC-Approved G-R Equipment on your Inert Gas Arc Welding!

HERE—at last—is a practical, smooth-working high frequency generator that keeps spurious and harmonic radiation within limits prescribed by the Federal Communications Commission. FCC-Approved G-R welders for inert gas arc welding—or the G-R Type OC-54 Tube Oscillator and tuned torch equipment for your own welding machine—not only end your interference problems but give you better, smoother inert gas arc welding as well.



● G-R Type OC-54 oscillator (cutaway view) and tuned torch. Oscillator is built-in on IGT models of G-R welders.

Write or wire now for literature and prices. Units available in ratings to 750 amperes.

GLENN-ROBERTS COMPANY · INC.

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The MECO Safe-T-Chek is the only regulator with a *built-in,* self-actuating safety valve that controls excessive pressures due to careless handling or failure of seating. This *built-in* safety feature comes to you at no additional cost. See your MECO Dealer TODAY.

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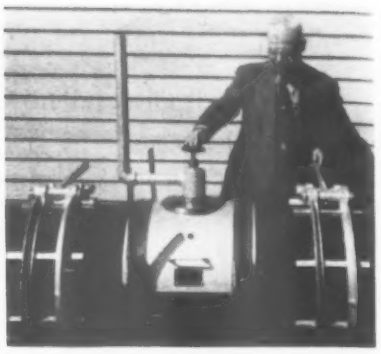
Modern Engineering CO., Inc.

3411-D PINE BLVD. ST. LOUIS 3, MO.



NO WASTED gas when Tipton pipeline patch is installed on large diameter pipelines

Pipeline Patch

THE Tipton high pressure pipe line patch may be installed while the line is in operation, the manufacturer claims. On large diameter natural gas lines, this feature would save more than 500,000 cu. ft. of gas per mile.

Safety features of the patch are the specially designed gasket to seal off the pressure and the vent plug which allows the gas or oil to be vented away while the patch is being welded.

Gasket is held in place by Tipton clamps while the welder puts on the stringer bead. Clamps are then removed and welding of gasket completed. The vent plug is next closed and vent line and jacket removed. Plug is sealed by welding.

When installing the patches, manufacturers advise applying a Tipton line-up clamp about 18 in. on each side of the patch, as shown in illustration. J. J. TIPTON, Box 390, Paola, Kansas.

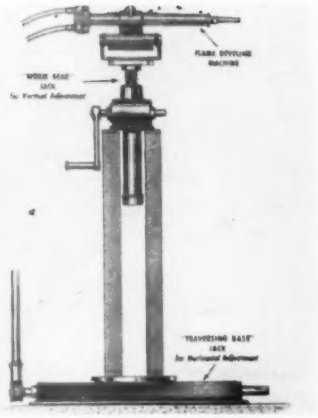
* * *

VERTICAL bar controls current setting in improved Birdsell a-c portable welder

Arc Welder

CURRENT control on the improved Birdsell Model 250 a-c welder is managed by means of the verticle sliding bar at the top of the machine. Heat values are calibrated in ten steps with positioning at any one stop afforded by a tightening screw.

Unload voltage is claimed to be 53 volts. Current capacity from 15 to 250 amp is provided. All machines are wound uniformly so that two or more machines can be coupled for heavy welding. Heavy mica insulation is added to every point where special protection is needed. Welder is designed for operation on either 110 or 220 volt lines. BIRDSELL MFG. CO., INC., 500 San Antonio Rd., Los Altos, Calif.



THREE jacks lift beveler frame up to flame-bevel edges of sheet prior to welding

Jacks Help Flame Beveling

ACCURATE flame-beveling of tank sheet edges preparatory to welding was facilitated by a vertically mobile frame that is raised and lowered by worm-gear jacks. In ordinary usage, the flame-beveling apparatus is stationary and the tank is raised or lowered.

The flame-beveling machine was mounted on a frame controlled by three jacks and thus brought to the sheet. In addition three traversing-base jacks were mounted at the bottom of the frame to permit horizontal movement. Additional vertical adjustment is made possible by the use of two traversing bases at either end of the tank.

Duff-Norton worm-gear jacks may be used in horizontal, inverted or vertical positions. Jack capacities range from 5 to 50 tons with lifts from 3 to 25 in. Traversing base jacks have capacities from 25 to 75 tons, and raises from 9 in. to 12 in. THE DUFF-NORTON MFG. CO., 2709 Preble Ave., Pittsburgh 30.

* * *

Aluminum Alloy

A NEW aluminum alloy, designated as 150S, has been developed by Permanente Metals Corp. Yield strength, workability, welding and brazing qualities are intermediate between 3S and 52S.

An SO temper of the alloy is for deep drawing. For shallow drawing, an H22 temper is available in thicknesses from 0.32 to 0.17 in.

An H32 temper has better formability than 3S-H14 or 52S-H32 and a yield strength slightly under 3S-H14. It is available in thickness ranging from 0.020 to 0.170 in.

An H34 temper has formability about equal to 3S-H14 and 52S-H32, and yield strength halfway between 3S-H14 and 52S-H-32. Maximum thickness is 0.140 in.

Formability of H36 temper is about equal to 3SC-H16 or 52S-H36 and yield strength is equal to 3S-H18 or 52S-H32. Maximum thickness is 0.102 in.

For blanking or slight forming operations there is an H38 temper in a maximum thickness of 0.072 in.

More than two years of research and field testing went into the 150S alloy. PERMANENTE METALS, 1924 Broadway, Oakland 12, Calif.

A New ADVANCE IN WELDING TIP CLEANERS

THERMO Spiral TIP CLEANERS

NO MORE BROKEN CLEANERS

Positively GUARANTEED AGAINST BREAKAGE

12 SIZES IN A HANDY METAL CASE

Cleaning ridges running horizontally around cleaner (as in old type Thermo cleaners) make easy break points. The new Thermo Spiral cleaners eliminate this. Any broken Thermo Spiral Cleaner will be replaced free.

BIG SAVING IN TIP REPLACEMENT

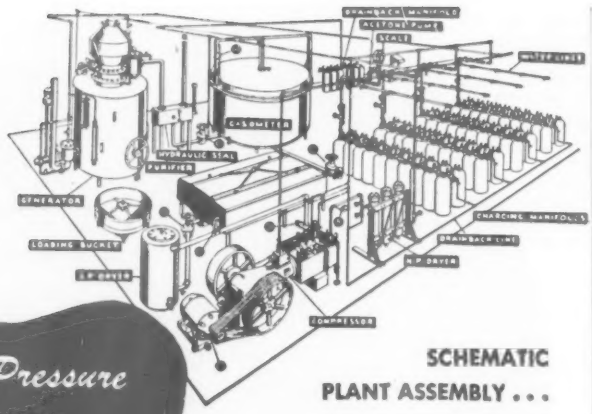
When a cleaner breaks off in a tip, replacement is usually required. If a Thermo Spiral Cleaner is jammed in a tip and broken, send us the broken cleaner. Any Thermo dealer WILL REPLACE CLEANER FREE OF CHARGE.

BETTER PERFORMANCE

Left hand spiral cleaning ridges with rounded edges allow carbon and slag to be removed without loading between ridges and scratching or enlarging the orifice. Result is the same clean, straight flame that comes from a new tip.

THERMACOTE COMPANY

Newark Chicago Los Angeles Portland



A *Low Pressure* ACETYLENE PRODUCING PLANT that Charges up to 160 CYLINDERS at ONE TIME

SCHEMATIC PLANT ASSEMBLY . . . showing placement of the various units that comprise the plant.

This plant layout provides for *extremely* simple operation and exceptionally *low* maintenance costs. Ample storage space is also provided for filled tanks. Being compactly designed the chief operator has all operations under surveillence at all times. Rated capacity of this assembly is 2700 cu. ft. per hour.

We invite your inquiries

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ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

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"FLUXINE" Fluxes are the result of over fifty years of scientific research into the metal-joining field. There are 89 FLUXINE Fluxes . . . one for every welding, silver soldering, brazing, and soft soldering operation . . . each with its own properties, designed for a particular metal-joining operation. All have been perfected not only for highest efficiency, speed, and long life, but for economy and safety as well. FLUXINE Fluxes produce no injurious fumes to irritate eyes or nose of the operator.

Write on your company letterhead for a generous sample stating which FLUXINE Flux you desire.

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(Est. 1875)
Dept. G, 669 W. Ohio St., Chicago 10, Ill.

No. 4 FLUXINE, in powder form, for welding cast iron with bronze rods.

No. 7 FLUXINE for welding all types of aluminum.

No. 18C FLUXINE for gas and atomic hydrogen welding of stainless steels and inconel.

No. 41 FLUXINE used with high-melting silver solders on copper and its alloys and on steel.

No. 42 FLUXINE used with Westinghouse Phos-Copper rods and low-melting silver solders on copper and its alloys.

No. 43 FLUXINE . . . non-glaring . . . used when low-melting silver solders are specified. No injurious fumes. Goes further than most fluxes.

FLUXINE FLUXES TO JOIN ALL METALS
TRADE MARK REGISTERED U. S. PAT. OFF.

SPLIT aluminum drum cushioned with rubber claimed to lengthen abrasive belt life

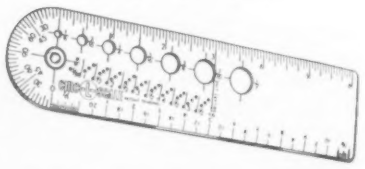
Drum Sander

COST of buffing, polishing and grinding is said to be reduced in plants where solid wheels and endless-belt abrasives are used with the new "Cone-Loc" drum sander. The sander is a balanced aluminum split drum, cushioned with rubber; the halves of the drum being locked into a solid drum by a cone-type washer (right). Its light weight makes it adaptable for use with a flexible shaft as well as on a stationary arbor.

Standard width abrasives, available in roll form, are wrapped around the drum and secured into place by pins that recede out of the way when the cone washer is tightened. During grinding operations the wheel does not lose diameter and never needs dressing.

Rubber-cushioned sander is available in sizes from 6¼ to 12 in. diameter and various standard widths and bores. A 6½ in. felt-cushioned sander is also available. AMERICAN DIAMOND SAW CO., 519 N. W. Park Ave., Portland 9, Ore.

* * *



ANGLES, circles, straight lines, letters, etc., made with draftsman's plastic drawing tool

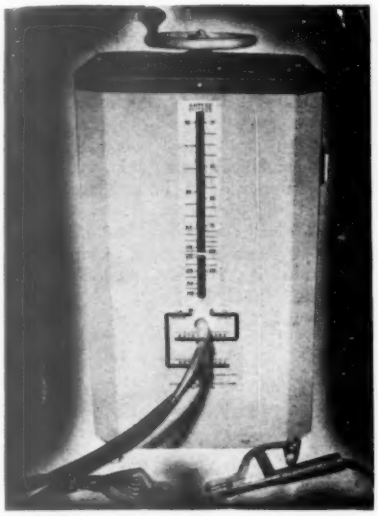
Drawing Tool

COMBINING features of a protractor, compass, square, scale and lettering device, the new "Circ-L-Scale" is vest-pocket size. Engineers, draftsmen, office workers, etc., will find it useful. L. A. CUSON, 9100 Roselawn Ave., Detroit 4.

* * *

Air Drill

WEIGHING only two pounds, including a ¼-in. capacity three-jaw chuck, a small pneumatic drill turns up free speeds of 1,200, 2,400 and 4,800 rpm. The pistol-grip handle and the motor housing are made of heat-treated aluminum. A button-type throttle permits accurate control of the drill bit. Length of this drill, including chuck, is 6⅜ in. MASTER PNEUMATIC TOOL CO., INC., Orwell, O.



CONVECTION cooling featured on new 200-amp a-c welder. Control is stepless

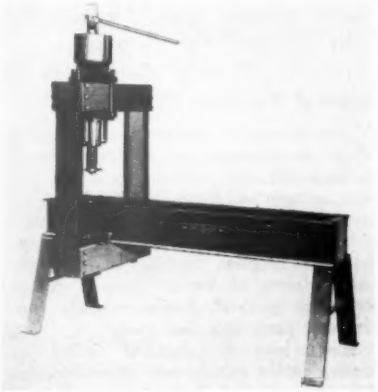
A-C Welder

STEPLESS current control ranging from 20 to 285 amp is one of the features of the "Eutecarc" a-c welder. Electrodes from 1/16 in. to ¼ in. diameter may be used with this machine.

A specially designed drip-proof case with natural convection cooling is said to eliminate the need for a cooling fan. Its capacity is approved under NEMA and Underwriters' Laboratories ratings.

Smooth-running casters permit easy moving of the welder. Compact in design and strongly built, its overall dimensions are 17 by 17 by 32 in. Standard accessories include electrode holder, cables, ground clamps, wall receptacle and plug, helmet. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

* * *



POSITIONED at any point on track of hydraulic press, ram provides 50-ton pressure

Hydraulic Press

MOVABLE ram supported on rollers and capable of being positioned at any point on the track is featured on a 50-ton hydraulic press built for welding shops to use in holding and forming jobs. Spring action removes the ram clear of the work for better accessibility. Pressure is said to be quickly applied and released. BEE-LINE Co., Davenport, Ia.

HOME repairs on metal furniture, autos, etc., facilitated by 60-amp a-c welder

60-Amp A-C Welder

A SMALL low cost arc welder, the "Lincwelder 60", operating on a 110 volt lighting circuit, has been designed for use in body repair shops, bicycle, radio, refrigerator repair and motor repair shops and for use by plumbers, millwrights, heating, electrical and sheet metal contractors.

It is claimed handy for home repairs to cars, metal furniture, broken castings and pipe, as well as for building different kinds of shop and home equipment.

Made with electrical steel, mica insulation and glass covered copper windings, it is approved by Underwriter's Laboratories. Maximum output is 60 amp on a 110-volt light circuit fused for 30 amp. Weighing only 50 lb, it can be carried by its handle and plugged into the nearest light socket.

Welder is sold complete with 6-foot insulated cord and standard light socket plug, helmet and lens, electrode holder and 9-ft cable, ground cable and a supply of electrodes and brazing rods. LINCOLN ELECTRIC Co., Cleveland 1, O.

* * *

Recirculating Pump

CAPABLE of pumping 7⅔ gal per minute against a 2-ft head or 2⅔ gal per minute against a 10-ft head, the Thermador recirculating pump No. P-1 is powered by a 1/35-hp motor. The motor operates on 115 volts a-c, 60-cycle current and uses 80 watts at 3,100 rpm.

The pump has been tested in localities where water, climatic and dust conditions were most severe and to numerous laboratory tests. It is recommended for resistance-welding and other machine-tool coolant systems. THERMADOR ELECTRICAL MFG. Co., 5119 District Blvd., Los Angeles 22.

* * *

Toggle Clamp

A NEW model toggle clamp in the "De-Sta-Co" line, Model 225-U, is a compact holding unit with its clamping bar moving into a retracted vertical position away from work as clamp is opened. Advantages claimed include: reamed working surfaces, stainless steel bearings, rugged construction and fast clamping action.

Clamp comes equipped with rubber-tipped bolt assembly adjustable both horizontally and to work height, and is 1⅞ in. high by 6½ in. long when bar is in horizontal work-holding position. DETROIT STAMPING Co., 372 Midland Ave., Detroit 3, Mich.

Tempilstiks°

the amazing Crayons that tell temperatures

A simple method of controlling temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

Also available in pellet and liquid form

It's this simple: Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

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gives up to 2000 readings

Available in these temperatures (° F)			
125	275	500	1100
138	288	550	1150
150	300	600	1200
163	313	650	1250
175	325	700	1300
188	338	750	1350
200	350	800	1400
213	363	850	1450
225	375	900	1500
238	388	950	1550
250	400	1000	1600
263	450	1050	

FREE —Tempil° "Basic Guide to Ferrous Metallurgy" — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

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We invite inquiries from reputable distributors interested in handling Tempil° Products.

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CARBON ELECTRODES

Uniform composition of Speer Carbon Electrodes provides even, steady burning, with maximum heat and penetration at welding point. High current carrying capacity plus exceptional stability, means less spluttering and spindling waste... 13% more welds per inch of rod.

This smooth burning develops a better point, as well, concentrating the arc for hotter, more uniform welds.

4 ELECTRODE GRADES AVAILABLE IN STANDARD SIZES

For D.C. Welding

Speer Carbon Rods—Standard grade, hard and strong to last long when current density requirements are normal.

Speer Hold-Ark Rods—Softer than carbon rods and with higher carrying capacity. Offer high resistance to sudden impact and strain.

Speer Special Graphite Rods—Highly graphitized for use with high amperages and temperatures. Give longer life than other grades for continuous severe service on large work.

For A.C. Welding

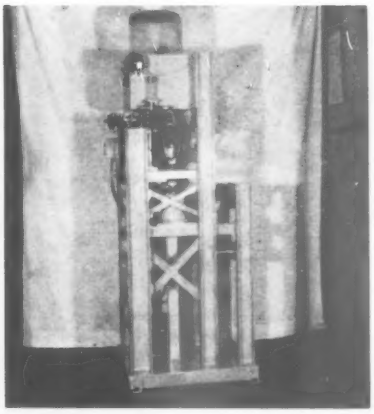
Speer ACWeld Electrodes—Plain, or copper-coated for better carrying capacity and burning qualities when current is high.

And be sure of best results, use Speer Welding Plates, readily cut or shaped to any desired shape or form, and Speer Welding Paste, a superior fire-resistant paste, easy to mold.

Write for bulletin listing available Speer Electrode sizes.

5021

Speer
CARBON COMPANY
ST. MARYS, PENNA.



PYREX jar at top of welding machine shields atomic-hydrogen brazing of cuff links

Atomic Hydrogen Brazing

PRODUCTION brazing of gold cuff links by the atomic-hydrogen process is accomplished in a new "Belco" welding machine. Welding or brazing operations are carried on in a hydrogen atmosphere in an inverted Pyrex jar at top of machine.

The two parts to be joined are made of filled gold. A gold brazing ring is placed at the junction of the decorative "button" and the shank of the link. The assembly is then put in a loading fixture on an indexing dial below the jar.

Loading fixtures are lifted up into the jar for brazing by a motor-operated cam mechanism. After brazing, the fixture returns to the dial where it remains until it revolves to face the operator who removes it and replaces it with another.

Since no flux is used, component jewelry parts can be highly polished before brazing and come out unmarred. Output of the machine is 2800 links per 8-hour day.

Loading devices and heat of the arc can be varied to join many types of small assemblies. Original use of this machine was in welding tungsten leads of 0.040 in. diameter with pure nickel. BELLEVILLE ENGINEERING CO., 367-69 Broad St., Newark 2, N.J.

* * *

Tack-Welding Electrodes

DESIGNED for making high speed tack welds on heavy weldments, a new E-6020 electrode is said to avoid need for breaking excess coating from the end each time the arc is started. This Hobart No. 384 electrode will restart the arc with a mere touch, says manufacturer. The coating has sufficient dielectric strength to withstand being scraped against the workpiece or ground without arcing through.

In addition to tack welding, the concentrated arc makes the electrode useful for scrap cutting, the manufacturers claim. Electrode is available in 1/8, 5/32 and 3/16 in. sizes in 14 in. lengths and in 18 in. lengths in the 1/4 in. diameter. HOBART BROTHERS CO., Troy, O.

* * *

Oxygen Hose

ADDITION of 3/4 in. and 1 in. single line neoprene hose to the Airco line of welding accessories has been done to supply users of oxygen for heavy cutting, decarburization of steel and large scrapping operations. It will be useful also in oxygen pipeline installations.

Both diameters can be used with 200 psi working pressures. Inner lining of the hose is made of neoprene rubber and the remainder of vulcanized natural rubber and braided fabric. Both 3/4 in. and 1 in. diameter are available in standard 50-ft. lengths. Hose connection fittings and the wrench necessary for assembling are available where the hose is sold. AIR REDUCTION SALES CO., 60 East 42nd St., New York City 17.

* * *

RUGGED phenolic frame and domed side screens on eye cups give strength, cool vision

Chipping Goggle

DOMED side screens provide a greater cup area for cooler ventilation and more side vision on new chippers' goggles. The frame is compression molded of a strong phenolic compound which is noninflammable, moisture and heat-resistant. Eyecups are individually molded and have larger, rounded face-contacting edges; they will withstand more impact than conventional goggles, states manufacturer.

Other features include a chain bridge enclosed in a form-fit plastic-covered tube resting on the nose, large lens rings, one-piece rubber headband. The goggle is fitted with "Super Armorplate" plano lenses, but can be supplied with 6 curve clear or "Calobar" lenses. AMERICAN OPTICAL CO., Southbridge, Mass.

* * *

General Purpose Electrode

GENERAL purpose electrode, also adapted to maintenance and production work on high-alloy and high-carbon steels, has been named "All-State No. 252." Tensile strength of 85 to 95,000 psi is claimed with good heat, corrosion and wear resistance. It gives superior performance, maker claims, on low-alloy steels without preheat or postheat, dissimilar steels, case hardened parts and clad steels.

Applications in chemical industries, furnace repair, mining and railroad equipment are expected. It is said to withstand temperatures up to 2,150F.

Uses where sulfur gases are a problem are recommended. Preheat of base metal to 300-500 F is advised for strong, crack-free welds on furnace parts.

An a-c/d-c electrode, it should be on reverse polarity with d-c current. Yield strength is 50 to 60,000 psi, elongation 35-45%, reduction of area 35-50% and impact resistance at room temperature (Charpy keyhole) 150-175. ALL-STATE WELDING ALLOYS CO., 273 Ferris Ave., White Plains, N. Y.

ZINC-COATED mufflers for autos are welded by air-hydraulic type 16-gun welder

Multi-Spot Welder

"AIR-SPEED" operation on a new Taylor-Winfield welder takes advantage of the compact hydraulic gun and eliminates the need for a hydraulic pumping unit. The welding pressure is obtained by air-oil boosters operating through air valves connected to the main air supply and working in sequence. Each welding gun passes welding current when a contactor, actuated by the sequencing mechanism, energizes the primary of the welding transformer.

Welder shown is welding baffles in automobile mufflers made of 0.040-in. zinc-coated steel at the rate of 480 per hour. Eight welds are made on top of the muffler at the same time that eight are made on the bottom. TAYLOR WINFIELD CORP., Warren, O.

* * *

Air Shutoff Valve

WITH but one moving part, a new automatic brass shutoff valve for compressed air lines is said to close the break in a hose instantly. The valve shuts off the pressure, permitting only a light stream of air to escape through a by-pass. When break is repaired or a different tool is attached, the pressure is equalized on both sides of the valve and a spring opens it automatically. The valve is claimed to have no effect on flow and to operate under varying pressures. It can also be used for gases, steam and light liquids flowing under pressure. Valve is made to fit standard connections at the intake end of the hose. OLIN GAS ENGINE CO., 9 Lafayette Ave., Buffalo 13, N. Y.

* * *

Part Cabinets

CABINETS which can be placed singly, side by side, back to back or stacked on top of each other are available for welding distributors, for welding shops or for offices and stores.

The frames are welded into a single solid assembly. The drawers have adjustable cross dividers on 1-in. centers. Lengthwise dividers may be added or removed at will. Label holders are furnished.

Two sizes of cabinets are being made; the "Equipto No. 11" with 18 drawers and the No. 8 with 8 drawers. Both are 12 in. deep. EQUIPTO, DIVISION OF AURORA EQUIPMENT CO., Aurora, Ill.

For BETTER • • MORE EFFICIENT SILVER BRAZING

USE THE NEW

FLUX-POT

for

FAST EFFICIENT FLUX HANDLING

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Unit complete with 6-ft. rubber cord and plug.

•

Fully automatic thermostat control set to keep flux at constant 180° temperature.

This pot provides a low-cost labor and material saving means of handling flux for Industrial Silver Brazing. ECONOMICAL . . . will pay its original cost in a short time by increasing brazing efficiency and output. Enables the user to extend volume of usable flux by 20% water dilution with practically no splash loss. GET DETAILS NOW!

STEEL SALES CORPORATION

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miller

NEW "70" SERIES A. C. ARC WELDERS

- **4 MODELS—20-335 AMPS**
- **NEW STREAMLINED CASE**
- **HIGH-EFFICIENCY DESIGN**

For light production—for maintenance and repair—select the New "70" Series Model that best fits your requirements. They're all quality-built, service-tested for long-time, trouble-free, economical use!

See your **miller** Distributor!

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APPLETON, WISCONSIN

News of the Industry

AWMA Broadens Membership Rules

THE American Weldment Manufacturers Association has announced that its membership is now open to companies producing commercial weldments that from time to time are offered for sale on the open market. This ruling includes companies making weldments as component parts for their own products, providing such weldments are occasionally sold to outside fabricators or manufacturers. Previously, the AWMA had restricted membership to those companies engaged in continuous production of weldments for the open market.

Membership dues have been established on a bracketed dollar volume of sales basis because of the larger possible number of member companies. The constitution and by-laws of the association were changed by members to include the new rules.

All companies interested in AWMA membership are invited to write to association headquarters, 332 South Michigan Ave., Chicago 4.

* * *

Discuss Weldor Qualifications At Boiler Inspectors' Meeting

ESTABLISHMENT of welding procedures and qualifications for weldors was reviewed by E. R. Seabloom, supervising engineer, Crane Co., at the 19th general meeting of the National Board of Boiler and Pressure Vessel Inspectors in Chicago, May 16-19. Mr. Seabloom confined his talk to the manual arc and gas welding of materials to pass the guided-bend test, principally carbon steel and butt joints. On an inspection trip to the Crane Co., the visiting inspectors saw welds being made in accordance with the procedures described by Mr. Seabloom. Testing methods were also shown.

Speaking on the subject of boiler repairs, Ralph Anderson, president of A & J Iron Works, Chicago, made clear the important distinction between "qualified" and "approved" weldors. Qualified weldors are those who must pass the tests outlined in P-112 of ASME Boiler Code.

The ASME Boiler Code Committee, meeting in conjunction with the National Board of Boiler Inspectors, held a business session on May 17. Members of both groups were guests of the Chicago ASME section.

* * *

Plant Maintenance Show Scheduled for Cleveland

THE first Plant Maintenance Show and Exposition, devoted to cost reduction through improved installation, operation and maintenance of equipment and services, will be held in the Municipal Auditorium, Cleveland, Jan. 16-19, 1950. Concurrently with the show, a four-day conference on plant maintenance methods will be held under the general chairmanship of L. C. Morrow, editor, *Factory Management & Maintenance*, a McGraw-Hill publication.

Exhibits and conference subjects will cover maintenance welding, cutting equipment and methods, air conditioning, building materials, employee relations, management consultation services, power generation, power transmission, training and safety programs and materials handling methods and supplies.

* * *

McKay Co. Moves Electrode Sales

THE electrode sales department of the McKay Co. was recently moved from York, Pa., to company executive offices in the McKay Building, 1005 Liberty Ave., Pittsburgh 22. Fred A. Kaufman, electrode sales manager, and his entire staff made the move from York.

* * *

"Economy" the Theme Of 31st Metal Show

"ECONOMY IN PRODUCTION" will be the Central theme of the 31st National Metal Congress and Exposition, to be held Oct. 17 to 21 at Cleveland's Public Auditorium. National attention will be concentrated on the efficiency of modern industrial equipment. Actual demonstrations will show how savings are effected by reducing unit cost of products.

More than 50,000 management officials, engineers, production specialists and sales executives are expected to attend the exposition, and hundreds of exhibitors in the metals processing and fabricating fields will be present to show why and how equipment reduces cost, according to W. H. Eisenman, managing director of the show.

Cooperating to put on the big show are the American Welding Society, American Society for Metals, American Institute of Mining and Metallurgical Engineers, Metals Division, and the Society for Non-Destructive Testing.

* * *

Precision Welding Done At Atomic-Energy Plant

WELDING delicate equipment in place to tolerances of ten thousandths of an inch was accomplished by weldors from regular construction crews at the Hanford, Wash., plant of the Atomic Energy Commission, reports BUSINESS WEEK, a McGraw-Hill publication. Tolerances were critical both before and after welding.

Metallurgists had to be called in to set up welding procedures and develop the techniques necessary to carry out the installation of the equipment in one 40-ft. section.

All of the weldors on the job were selected after a series of careful tests and put through a special training course. They drew standard weldor's pay—only benefit being in prestige and experience.

* * *

$2,250 in Prize Money Offered by RWMA

CASH prizes totaling $2,250 are being offered by the Resistance Welder Manufacturers Association for outstanding papers dealing with resistance-welding subjects. The papers submitted in the contest must be delivered at American Welding Society headquarters, New York City, not later than 5:00 P. M., July 31. Three copies are sufficient if a paper is mailed before July 1, but six copies should be furnished if it is timed to arrive at AWS headquarters between July 1 and July 31.

First prize is $750 for the best paper from an industrial source, consulting engineer, private or government laboratory on resistance welding. Second and third prizes of $500 and $250 in this classification are offered.

Papers from a university source, either instructor, graduate student or research fellow, may win a first prize of $300 or a second prize of $200. A special prize of $250 is offered for the "greatest original contribution to the advancement and use of resistance welding" from a university undergraduate.

The contest is open to anyone, without restriction, from the United States, its possessions and Canada, or from any member of AWS from any place in the world. Contest judges will be appointed by the American Welding Society, and awards will be made at the 1949 AWS convention in Cleveland.

* * *

Open House Staged by U. S. Steel Supply

U. S. STEEL SUPPLY Co., Cleveland district, entertained nearly 3,000 customers and friends at an open house May 14 in its new warehouse at 7105 Bessemer Ave. The new plant covers 176,000 sq. ft.

All traffic in the warehouse is directed to move in one direction. Incoming steel is received at the east end of the building and is stored, processed and handled in four main aisles, each 440 ft. in length. Orders for shipment are moved to a transfer aisle for loading on trucks which dock at the west side of the building.

New equipment installed in the warehouse includes a hydraulic-controlled, high-speed friction saw and a 52-ft span overhead crane of 10-ton capacity.

Hosts at the open house were L. B. Worthington, president of U. S. Steel Supply Co. and E. J. Heffner, Cleveland district manager.

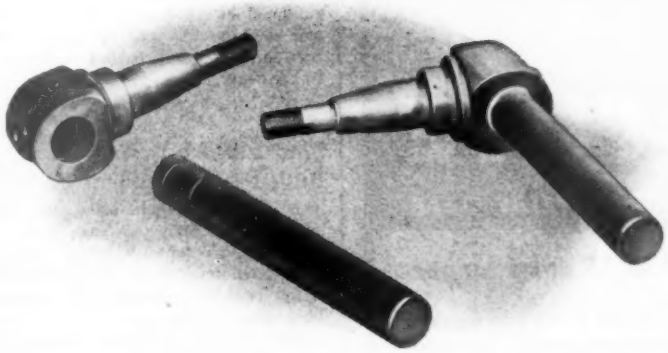
They couldn't break this pony!

They drove this pony tractor full tilt over a rough field—and suddenly swung the front wheels hard, almost at right angles. They wanted to find out if the EASY-FLO brazed king pin-axle assembly could take it. They had designed this assembly for EASY-FLO brazed construction because this simple method would save the making of the large one-piece forging and the extra die costs and machining that it involved. When no breakages occurred after repeated tests, they concluded the EASY-FLO brazed assembly had all the strength it would ever need. Time has proved they were right. Their experience confirms a fact that thousands of manufacturers have learned—

EASY-FLO JOINTS HAVE ONE-PIECE STRENGTH

Yes, innumerable tensile, bend and pressure tests on joints of every kind, in ferrous, non-ferrous and dissimilar metals, have established this fact—joints properly made with the low-temperature silver alloy EASY-FLO are always strong as the parent metals—and in most cases, stronger. They'll take any punishment the metals themselves will stand.

HIGH STRENGTH AT LOW COST



As in the case of the king pin-axle assembly, records on thousands of jobs show that a change to EASY-FLO brazed construction, not only provides all the strength needed, but also brings costs 'way down—due to savings in time, labor and metal. Without obligation we'll be glad to send a field engineer to help you determine where and how EASY-FLO brazing will cut your costs. For full EASY-FLO details write today for BULLETINS 12-A and 15.

1 MINUTE DOES IT

Steel parts are assembled for brazing with rings of 1/16" EASY-FLO wire preplaced in the two grooves you see in the end of the 1⅛" dia. king pin. Using induction heating, the joint is completed in just one minute flat.

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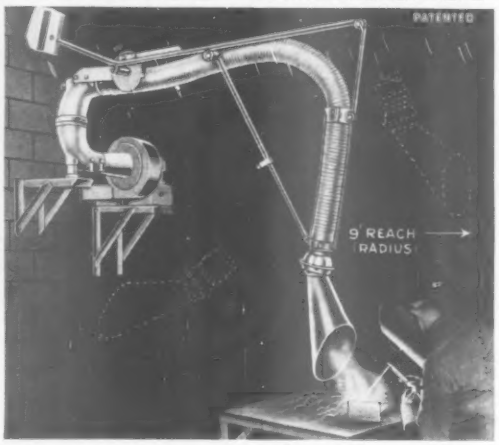
Agents in Principal Cities

RUEMELIN Fume Collector



(Above) Welding without ventilating snout. Note smoke clouds and poor vision. Gases and heat surround operator's helmet.

(Right) Collecting fumes with a Ruemelin Fume Collector.

REMOVES WELDING FUMES *at the Source!*

Solve your welding fume problem efficiently by installing Ruemelin Welding Fume Collectors. They produce a powerful suction that removes smoke, gas and heat at the source. Guards employee health, resulting in less welder fatigue. Clears shop air with minimum heat loss. Covers maximum welding area vertically, horizontally and by circle swing. Made in 9 ft. and 15 ft. reach sizes. Shipped assembled, easy to install. Thousands in practical service. Free engineering service for your installation.

Write for our New Bulletin 37-D and list of users — just off the press.

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MANUFACTURERS AND ENGINEERS
SAND BLAST AND DUST COLLECTING EQUIPMENT
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List of representatives sent on request.

WALLACE OPTICAL COMPANY • INC

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Ryerson Open House Held at Philadelphia

JOSEPH T. RYERSON & SON, INC., steel distributors, held open house at their recently completed Philadelphia steel-service plant on May 20 and 21.

More than 2,800 customers and friends of the firm visited the plant on Friday; employees and their families numbering about 500 were entertained by the management on Saturday. All were taken on a tour of the plant, after which refreshments and dinner were served.

W. A. Redpath, manager of the plant, was host at the tour and dinner. Company officials present were Edward L. Ryerson, chairman of the board; Everett D. Graff, president; Robert C. Ross, assistant to the president; Harold B. Ressler, Ainslie Y. Sawyer and William Seymour, Jr., vice-presidents, and C. L. Hardy, former plant manager and now assistant vice-president.

• • •

Plastic Finished Tubes Developed by J & L

NEW "Perma-tube" welded steel tubing, coated with a plastic rust-resisting finish, has been developed by Jones & Laughlin Steel Corp., Pittsburgh.

The new tubing is expected to find many uses in outdoor structures and other applications where light wall steel tubular members are exposed to corrosive atmosphere. It can be fabricated by bending, expanding, flanging, upsetting, fluting and flattening without damage to the finish.

"Perma-tube" did not corrode until more than 2,000 hours exposure in accelerated salt spray tests, makers claim, and in some cases, lasted 3,000 hours before corrosion appeared. Ordinary tubing, electro-galvanized, started to corrode in 24 hours and showed rust spots in 350 hours.

A "vinsynite" pre-treatment adheres tightly to the surface, phosphatizes the metal and deposits a thin film (about 1/30,000 in. thick) of protective coating over the phosphatized surface in one operation. It is applied to the steel tubing by dipping.

• • •

Four Factory Branches Built by Independent Pneumatic

NEW factory branch sales and service buildings in Chicago, New York, Pittsburgh and Toronto, Canada, have been constructed recently by Independent Pneumatic Tool Co., Aurora, Ill., makers of Thor power tools.

The four new buildings, replacing previous office sites in the same cities, are completely equipped service stations and staffed by factory trained engineers and also serve as sales headquarters for Thor distributors and users.

The Chicago branch building, largest in the company's 20-city chain, is located at 1405 West Washington Blvd. The New York building is at 32-34 Greenpoint Ave., in the Long Island City section. In Pittsburgh the branch office is at 204 Thomas St., and the Toronto office is at 1909 Davenport Rd. The company's export division is at 330 West 42nd St., New York City 18.

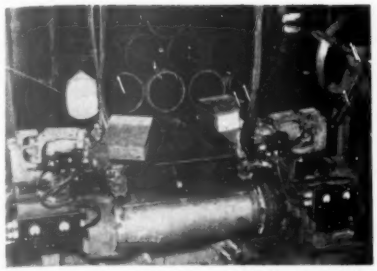


Photo courtesy Linde Air Products Co.

SIMULTANEOUS welding of both ends on small propane tank. Speed is 45-60 ipm

Double-Headed Fixture Welds Both Tank Ends

BOTH ends of a tank are welded simultaneously by a double-headed welding fixture developed by a southern manufacturer. Designed for one-way operation, the fixture is loaded with an assembly at one end and completed tanks are taken from the other.

The welding heads are attached to the fixture with a hinged bracket and an adjustment screw so that the welding wire can be positioned over the seam. The control boxes are mounted in front of the fixture below the welding heads. A single start-stop switch controls the welders and the motor for rotating the cylinder. An air piston holds the cylinder in position and centers it for rotation during welding.

Welding speeds vary between 48 and 60 ipm, making possible an hourly production of 30 to 40 tanks. Use of the equipment has so far been confined to a small-size propane tank.

* * *

Stoody Announces New Distributors

THE following distributors of Stoody hard-facing alloys have recently been added to the Stoody sales organization: Mobile Welding Supply Co., Inc., Mobile 12, Ala.; Morris, Wheeler & Co., Inc., Philadelphia 29, Pa.; Maine Oxy-Acetylene Supply Co., Auburn, Maine; The Alfred B. King Co., New Haven 3, Conn.; Fuller Supply Co., Inc., Utica 2, N. Y., and Corp. Brothers, Inc., Providence 3, R. I.

Foreign distributors recently added are: Manuel Sigren, Santiago, Chile, and Bandeira De Mello S. A., Rio de Janeiro, Brazil.

* * *

Michigan Distributor Changes Address

WAYNE WELDING SUPPLY, INC., moved recently into new headquarters at 5909 Middlebelt Rd., Garden City, Mich. The previous address was 1523 Wayne Rd., Wayne, Mich.

* * *

Correction

WE REGRET to say that illustrations were mistakenly switched in the patent notices of the two electrode holders pictured on page 90 of our June issue. Bottom drawing on the page is the holder patented by Martin Wells of Los Angeles while the top drawing is the holder patented by Arthur R. Wynn.

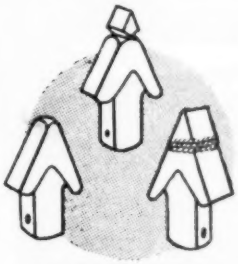
Why Use Old-Fashioned Methods . . . when . . .

MANGANAL

Trade Mark Reg. U. S. Patent Office
11% to 13½% Manganese-Nickel Steel

WEDGE BARS

put your worn equipment back to work . . .



Wedge Bar attached to worn down Shovel & Dipper Teeth

FASTER . . . MORE ECONOMICALLY

Back in the old days worn bucket teeth had to be built-up with electrodes to the shape desired. Now, MANGANAL 11% to 13½% Manganese Steel WEDGE BARS eliminate the need of building-up weld material. They cost less and usually outlast new teeth. MANGANAL workhardens to 550 Brinell. Thrives under severe impact and abrasion. Tensile strength is high — up to 150,000 p.s.i. Available in 22 sizes to fit any tooth size. MANGANAL is the short-cut to true economy.

PRACTICAL APPLICATIONS:
- Dipper Teeth
- Bucket Lips
- Side Cutters
- Dredge Cutter Heads
- Filler Metal for Manganese R.R. Trackwork

FREE: Send for copy of latest "Manganal Marketer."

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ECONOMICAL
DEPENDABLE
for
Welding & Cutting
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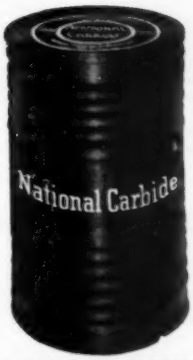

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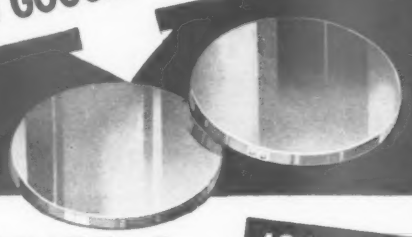

★ Agile Metalklad Welding Goggle Lens are clad with a hard and durable alloy of high reflectivity on the basic welding lens. This transparent mirror-like surface completely reflects harmful ultra-violet and infra-red rays and eliminates interfering glare. The clear and sharp picture of the work obtained through these lenses decreases eye-fatigue and eye-strain of the operator, thereby increasing production efficiency.

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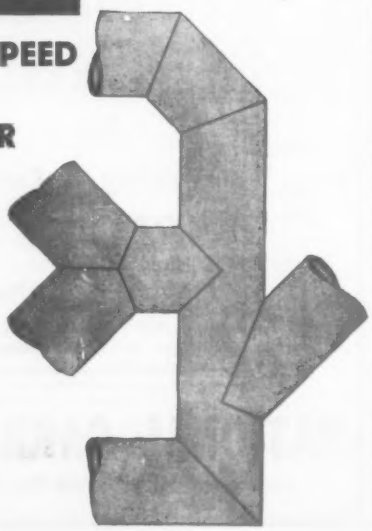
IF YOUR LOCAL DISTRIBUTOR CANNOT SUPPLY YOU CAN ORDER DIRECT.



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American Bridge Holds Open House at Gary

FAMILIES and friends of 2,500 employees of the Gary, Ind., plant of American Bridge Co. and the general public were guests of the company during a one-day open house on June 1. Several thousand high school students were brought to the plant, a U. S. Steel subsidiary, by chartered buses.

Products being fabricated while visitors watched included huge girders and other structural shapes for buildings, bridges, dams, and power plants. Roped-off aisles guided the visitors through the storage, riveting, machining, welding, flame-cutting, grinding, painting and shipping departments. Large signs on machinery and products along the aisles explained their function and how they were made.

Heavy welding operations were in progress on Diesel locomotive underframes, earth scrapers, bulldozers, heavy box beams and building structurals. Flame-cutting was demonstrated on duplicate shapes and small parts for earthmoving equipment, angle plates, etc.

A special tent exhibit near the exit of the plant included several bridge models for which American Bridge has constructed major components. Displays showing the part the company plays in the business and educational life of Gary were also on view.

Hosts included Frank K. McDanel, president of American Bridge, A. J. Paddock, operating vice-president, and R. Bruce Hunter, present manager of the Gary plant.

• • •

Welded Structures Book in Third Printing

"MANUEL OF DESIGN FOR ARC WELDED STEEL STRUCTURES" by Lamotte T. Grover, is now in its third printing. The book was first published in 1946 and contains 300 pages. It is based on standards of the American Welding Society, the American Institute of Steel Construction and upon reports of the Welding Research Council of the Engineering Foundation.

Chapters are included on electrode requirements, specifications for welded connections for all sizes of rolled beams and a series of diagrams for the rapid design of welded connections. Cost is $3, and the volume may be obtained from the Air Reduction Sales Co., 60 East 42nd St., New York City 17, or any Airco sales office.

• • •

Thew Shovel Celebrates Fiftieth Anniversary

THE THEW SHOVEL CO., Lorain, O., will celebrate its 50th anniversary on July 17. Its history actually began 4 years earlier, in 1895, when Captain Richard P. Thew designed and built the first full revolving steam shovel.

Developed during the industrial expansion of the early 1900's, steam shovels were soon used in mines, brick plants, building excavations, etc. The first single motor electric shovel was built by Thew in 1903 and one of the earliest gasoline powered models in 1914.

Today, Thew operates 5 plants, 2 in Lorain, 2 in Elyria, O., and 1 in Bucyrus, Ohio.

Liquid Oxygen Converter Developed by Air Force

GREAT reductions in weight and bulk of containers for oxygen have been achieved by the air force recently using liquid oxygen converters. As yet, the greatest need for such a device has been to save weight in high-altitude flying operations. With adaptations, uses for converters in industrial and medical applications are foreseen.

The converter consists of a vacuum-walled container, a vaporizing coil, operating and safety valves. High pressure that builds up inside a closed container of liquid oxygen precludes the use of tightly closed bottles or tanks. Development has been carried out by the Army, Navy, and Bureau of Standards. Converter and fittings to supply a given amount of gas weigh as little as one-fifth that of gaseous containers. In military flying, the returning of empty, heavy gas cylinders from advanced bases for refilling has been a serious logistics problem.

In reliability and safety the new converter compares favorably with high-pressure gaseous oxygen systems. Wide variation is possible in container capacity, delivery flow, temperature and pressure specifications.

* * *

Suggestion Plans Need Publicity for Success

SUCCESSFUL employee suggestion plans are dependent on a continuous publicity campaign, according to a report by the Policyholders Service Bureau of the Metropolitan Life Insurance Co. Prompt decision on suggestions, both in making awards and in putting the suggested changes into effect, is also a prime necessity for a successful program. A copy of the report may be obtained by writing on your business stationery to Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York City 10.

* * *

Outlines Eye Safety Program At Air Reduction Co.

THE well-rounded eye safety program in effect at Air Reduction Co.'s welding and cutting equipment manufacturing plant was reviewed recently before the 19th Annual Greater New York Safety Convention held in New York City. Rowland V. Merrifield, insurance manager for Air Reduction, gave the presentation.

The program includes a thorough pre-placement physical examination including the Snallen acuity test and fluoroscopic study of the chest and stomach. Prospective employees who pass this test are familiarized with company rules and given "plano" safety spectacles. Within a week the new employee is given a visual efficiency examination at which time his eyes are examined by an opthalmologist. After he is certified, he is interviewed by an opthalmic dispenser who orders individually-prescribed spectacles, with hardened lenses and with shields for designated jobs.

Periodic re-examination of the eyes, duplicating initial procedures, is made every 18 months for employees under 40 years old and every other year for those 40 or over. Young employees who are myopic (near-sighted) are examined every six months.

Nearly 70% of all Air Reduction employees examined required some degree of visual correction, Mr. Merrifield revealed. In conclusion, Mr. Merrifield reminded the audience that much work is necessary before industrial eye-safety programs will cut down on figures such as the 300,000 eye injuries in 1947 recorded by state industrial accident commissions and the labor department.

* * *

Budd Co. Buys Red Lion Plant

THE Budd Company has recently acquired title to the Red Lion plant in Philadelphia, where on a lessee basis it has built stainless-steel railway passenger cars since the end of the war. The property cost $5,250,000 and includes 572 acres, 217 of which are used for manufacturing purposes.

More than 4,000 workers are employed in the plant which includes a concrete structure 569½ ft wide and 1800 ft long. On the property are an outdoor electrical substation, cooling water and sewer systems and a sewage disposal plant.

The Budd Co. will continue to use the plant for producing railway cars, stainless-steel truck trailer assemblies and railway disc brakes.

* * *

Stanley Works Adds Cold Rolling Facilities

STANLEY WORKS, New Britain, Conn., has let a contract to the Turner Construction Co., for an addition to its cold strip rolling mill.

The one-story structure, 84 by 82 ft, will have concrete foundations, brick masonry and structural steel framing. Work has started and completion is scheduled for the end of September.

DISPLAY boards showing electrode holders, ground clamps and cable connectors help Hobart distributors sell welding supplies. Similar boards display goggles, shields, etc.

How to use the OXYACETYLENE TORCH more skillfully on every-day welding jobs

HERE is a practical manual that explains both simple oxyacetylene welding techniques and the advanced methods and refinements that have been developed in the use of the oxyacetylene flame. You're taken in easy stages through flame cutting, bronze welding and brazing, the welding of various alloys to the specialized techniques now being used in pipe welding, the welding of light metals, etc.

PLUS . . practical tips on operating your own job-shop.
- **Analyzing shop overhead**
- **Setting up a cost system**
- **Job estimating**
- **Forms, codes and regulations**

Just Published

OXYACETYLENE WELDING and CUTTING

By STUART PLUMLEY
Revised by T. B. Jefferson
Editor, The Welding Engineer
345 pages • 8⅛ x 11 • $6.50

YOU'LL find everything in this book from basic information on lighting and adjusting your torch flame to the pre-heating that insures best results in welding aluminum castings . . . everything from laying out a templet for cutting a 90-degree elbow to using a soft solder to smooth out dents in automobile fenders.

Detailed Instruction on Pipe Welding

Here's the information you need to make you a finished pipe weldor . . . how to prepare the edge of the pipe . . . mark the line of cut accurately . . . make a templet to cut a 90-degree Y-branch . . . weld a joint between pieces of 2-inch pipe . . . protect the wood-work during the welding of a pipe joint . . . what to do about expansion and contraction in welding large diameter pipe, and many other specific job aids.

Data tables, charts, and "large-as-life" drawings explain and make crystal clear every point discussed in this guide.

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Send me Plumley's OXYACETYLENE WELDING AND CUTTING, (4th Edition) for ten days' examination on approval. In 10 days I will remit $6.50, plus a few cents delivery charge or return the book postpaid. We pay delivery charge if you send cash with this coupon. Same return privilege.

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A 170 Amp. AC Welder for $123.50!

110/220 VOLTS

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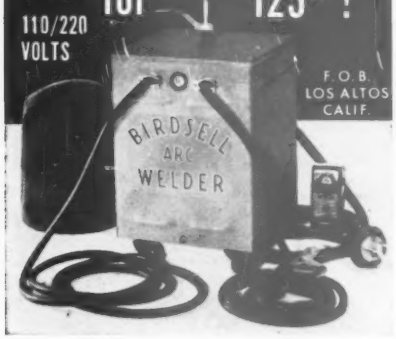

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2. Handles from 1/16" to 5/32" rod.
3. Stepless control from 10 to 170 amps.
4. Portable, weight 100 lbs.
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6. One year unconditional guarantee.
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★ When you are welding or brazing get the advantages of METAL BOND products. A type for every need. Each delivers quality results more easily and inexpensively.

★ Make your own test of METAL BOND products. Find out why METAL BOND is so widely used and why users standardize on these products.

★ Send for our handy-size catalog now. It contains much helpful welding, brazing and soldering information.

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ST. LOUIS 7, MISSOURI

New Distributors

AMPCO METAL, INC., Milwaukee has announced that its full line of arc welding electrodes will be handled by Omaha Welding Co., 1523 Marcy St., Omaha, Nebr., and Pye-Barker Welding Supply Co., 231 Pryor St., S. W., Atlanta, Ga.

* * *

AIR REDUCTION CO., New York City 17, has established a warehouse point with supplies of oxygen and acetylene at Fidelity Transfer & Storage Co., 1540 East Fifth St., Tulsa, Okla.

* * *

BIRDSELL MFG. CO., INC., Los Altos, Calif., has appointed Arizona Welding Equipment Co., 415 South Seventh St., Phoenix, Ariz., as distributors for its line of arc and spot welders.

About People

HARRY A. FOHL has been named chief engineer of Lukens Steel Co., Coatesville, Pa. NEILS H. JENSEN is the new assistant chief engineer and MALCOLM B. ANTRIM the new superintendent of electrical maintenance. P. C. HALDEMAN, chief engineer since 1932, and WALTER H. BURR, superintendent of electrical maintenance since 1921, will both retire on July 1, each having reached 70 years of age.

* * *

J. H. HUMBERSTONE was elected president of Arcrods Corp. at the annual meeting of the board of directors. He was associated with Arcrods at its formation and was subsequently director of research and more recently vice-president in charge of operations. W. E. BRAINARD will continue as vice-president in charge of operations, the post he assumed in December.

* * *

Westinghouse Electric Corp. announces that Vice-President L. E. OSBORNE has been assigned staff supervisor over all company manufacturing activities. JAMES H. JEWELL, recently elected vice-president, takes over staff supervision on all sales and marketing. JOHN K. HODNETTE becomes general manager of industrial products with headquarters at Pittsburgh. JOHN M. MCKIBBIN has been appointed general manager of consumer products with full responsibility for operation of appliances and home radio division.

* * *

DR. KARL T. COMPTON has been elected a director of the McGraw-Hill Publishing Co. Dr. Compton is chairman of the Research and Development Board of the National Military Establishment and chairman of the Corporation of the Massachusetts Institute of Technology. Until recently he was president of M. I. T. and during his career has held many important public and private research and administrative positions.

JAMES H. GOSS has been appointed manager of engineering in the control division of General Electric's Apparatus Department. JOHN W. BELANGER, manager of G-E's Turbine Division at Schenectady, and NICHOLAS M. DUCHEMIN, manager of the Meter and Instrument Divisions at Lynn, Mass., have been appointed assistant general managers of the Apparatus Dept.

* * *

HUGHES J. P. WASSERMAN, eminent welding inventor, and founder of the Swiss firm, Societe des Soudures Sastolin S. A., recently celebrated his 75th birthday in Lausanne, Switzerland. His son, RENE D. WASSERMAN, is president of Eutectic Welding Alloys Corp., New York City.

* * *

S. S. STEWART has been appointed purchasing agent, manufacturing division, Air Reduction Co. Headquarters will be at 125 Monitor St., Jersey City, N. J. Mr. Stewart joined Air Reduction in 1922 as production manager for the Wilson Welder and Metals Co., Inc.

* * *

GLENN O. CARTER, consulting engineer for the Linde Air Products Co., has been elected president of the United States Naval Academy Alumni Association. Mr. Carter is a 1905 graduate of the academy and first joined Linde in 1913. He is a past president of the Compressed Gas Association and the International Acetylene Association.

* * *

FRANK P. DENZEL was recently appointed general sales manager of Welding & Cutting Supply Co., Cleveland 15. Mr. Denzel was formerly with Linde Air Products Co.

* * *

A. F. ANJESKY, sales manager of Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, O., was recently elected president of the Monorail Manufacturer's Association.

* * *

G. J. GREEN, welding engineer of Dravo Corp., Pittsburgh, recently gave a speech before 60 of the company's superintendents and field engineers, on welding procedures and methods of field testing pipe welders.

* * *

JOHN VAN PERNIS has been appointed acting manager of Chicago Manufacturing and Distributing Co., manufacturers of weld chipping hammers, in the illness of T. L. ADIS.

* * *

JOHN J. MEADOWS is in charge of the reorganization of the mechanical engineering department of Sam Tour & Co., Inc.

* * *

PHILIP H. SMITH, director of research and development at the John Nooter Boiler Works Co., has been elected chairman of the St. Louis chapter of the National Association of Corrosion Engineers.

AMOS JOHNSON has recently joined the field sales department of Stoody Co., manufacturers of hard-facing alloys. Mr. Johnson will assist Stoody distributors in Minnesota and the Dakotas.

* * *

FRANK T. SISCO, director of alloys of iron research, has been appointed Technical Director of the Engineering Foundation, New York City.

* * *

THOMAS W. WRIGHT has been named to the sales staff of The Babcock & Wilcox Tube Co., New York District.

* * *

SAMUEL WIT has been named district sales manager of the Chicago office of Lukens Steel Co., Coatesville, Pa. Mr. Wit has been a sales engineer with Lukenweld with which he was associated since 1937. In 1943 he was named superintendent of Lukenweld Plant 2, and in 1945 was promoted to assistant chief engineer of Lukenweld.

* * *

GILFRY WARD has been named vice-president in charge of sales of the American Manganese Steel Division of the American Brake Shoe Co. He will be located in Chicago Heights, Ill.

* * *

ROBERT E. MARSHALL was elected secretary of Worthington Pump and Machinery Corp., Harrison, N. J., at a recent meeting of the board. He succeeds the late C. NEAL BARNEY.

* * *

DR. W. E. HANFORD, director of petroleum and chemical research for M. W. Kellogg Co., was recently elected a vice-president of the company.

* * *

HARRY S. HAGAN has been appointed manager of the Butler, Pa., freight car plant of Pullman-Standard Car Mfg. Co.

* * *

Died . . .

FRED S. DURHAM, SR., president of Bonney Forge & Tool Works, Allentown, Pa., passed away on Saturday, May 28.

* * *

V. S. RICE, 57, president of Virginia Welding Co., Charleston, W. Va., died on May 12 while attending the National Welding Supply Association meeting in Cincinnati. He had been in the welding business in Charleston since 1917 and is said to have brought the first welding torch and engine-driven arc welder into the state. The Virginia Welding Co. was started in conjunction with a welding job shop. Mr. Rice was an active member of American Welding Society, a member of the executive committee of NWSA and one of its co-founders.

* * *

RAYMOND J. SCHNEIBERG, assistant vice-president of Air Filter Corp., Milwaukee, died on May 22. Mr. Schneiberg was well known in the heating, ventilating, air conditioning and welding industries in Wisconsin, where he was engaged in sales and distribution of such products for many years.

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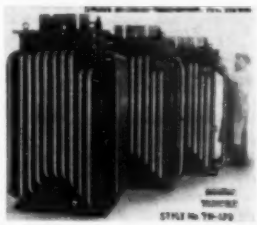

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The Technical Slant

Salesmanship

INCREASING WHOLESALE DRUG SALESMEN'S EFFECTIVENESS. By James H. Davis. Published by Bureau of Business Research, Ohio State University, Columbus, Ohio, 1948. Cloth, 6 x 9 in.; 193 pages. Price $3.

Salesmen and those who employ salesmen will find "Increasing Wholesale Drug Salesmen's Effectiveness" an extremely helpful guide in these days when a salesman must sell and sell effectively. This volume is based on a 72-day study of 70 wholesale drug salesmen. While the data given refers only to the selling of wholesale drugs, it is pertinent and applicable to any selling activity, including welding equipment and supplies.

The research carried on by Dr. Davis in this study was an attempt to determine more precisely what makes a salesman click. Purposes and methods of conducting the study and details on the sources opens the book. Then the reader is given a detailed account of a wholesale salesman's job, his working conditions and the background of his sales organization.

It is extremely enlightening to learn from time studies, as did Dr. Davis, of the considerable differences between good and poor salesmen in their sales approach and their use of effective and ineffective selling time. He was able to establish relationships between time spent on a call and the resultant sales as well as a relation between items mentioned and total sales. Other chapters discuss selling difficulties, job specifications and sales training and also give specific information about increasing a salesman's efficiency. Data presented is supplemented by some 70 tables and 22 charts. (See page 32 of this issue.)

* * *

Farm Machinery

FARM MACHINERY AND EQUIPMENT, 3rd Edition. By Harris Pearson Smith. Published by McGraw-Hill Book Co., New York, 1948. Cloth, 6 x 9 in.; 520 pages. Price $5.

The new edition of "Farm Machinery and Equipment" is an excellent text and reference covering the more important types of machines used in general farming. As such it should prove to be valuable for the job welding shop in rural areas, where an understanding of the assembly and operation of all types of equipment is required for successful shop repairs.

Recent years have seen many changes in farming methods that have reduced farm labor requirements as well as farm production costs. The author in his revision has remembered this fact and added considerable material dealing with farm mechanization. New chapters emphasize the improvements in tractor implements, especially those for row-crop tractors, the perfection of the self-propelled combine, the one-man self-tieing hay baler, the cotton picker, the corn picker, and the beet harvester. The section dealing with moldboard plows discusses all types of shares and gives pointers on sharpening them.

Ventilation

DESIGN OF INDUSTRIAL EXHAUST SYSTEMS, 2nd Edition. By John L. Alden. Published by Industrial Press, New York, 1948. Cloth, 5½ x 8½ in.; 252 pages. Price $3.50.

Two chapters have been added to the revised edition of "Design of Industrial Exhaust Systems" to make it more complete. Still missing, however, is a table of contents, which this reviewer thinks should be a part of any text or reference volume.

New chapters are on hoods for fumes and axial-flow fans. The other chapters discuss how to design, build or buy exhaust systems that will adequately and economically perform the functions required by law or prescribed by industrial hygiene specialists. In addition to exhaust ventilation there is information on low pressure pneumatic conveying, design of hoods, piping and structural details and the selection of dust separators and fans.

Some 120 drawings and diagrams should prove helpful in the design of exhaust systems for certain industries mentioned. Welding fume control is mentioned briefly, accompanied by a suggested portable hood design.

* * *

Government

THE HOOVER COMMISSION REPORT: On Organization of the Executive Branch of the Government. Published by McGraw-Hill Publishing Co., New York, 1949. Cloth, 6 x 9 in., 524 pages. Price $3.75.

Anyone interested in reducing his $7,500 share of the public debt will find this an important work on the need for streamlining our government. Ex-President Herbert Hoover headed the specially appointed commission which surveyed the executive branch of government. From its findings comes this condensed version of 23 separate reports on increasing the efficiency and reducing the expense of government. These reports cover all of the departments and many of the agencies and bureaus as well as general problems like statistical activities, accounting and budgeting, general management, research, federal-state relations and federal corporations.

The Hoover Commission Report is necessary reading for everyone interested in good government. The average reader will be amazed at the disclosure of inefficiencies, duplication and wastefulness.

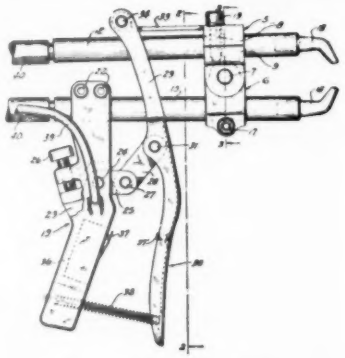
* * *

Metallurgy

WELDING METALLURGY, 2nd Edition. By O. H. Henry and G. E. Claussen, revised by G. E. Linnert. Published by American Welding Society, New York, 1949. Cloth, 5 x 7½ in.; 505 pages. Price $2.50.

The revised edition of "Welding Metallurgy" has been expanded by 150 pages to include welding developments of the past eight years. Simplicity of language, laudable in the first edition, has been retained. Designed as a book for both the technical and non-technical reader, it opens with an introduction to the fundamentals of metallurgy. Welding processes, structures of metals, fluxes and slags and the welding metallurgy of specific materials occupy subsequent chapters.

From the Patent Office

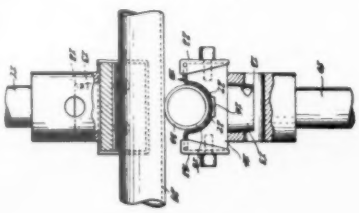


Spot Welding Gun

2,464,054. JOSEPH J. PANIK, Detroit, Mich. Assigned to Banner Products Co., Milwaukee, Wis. Filed Oct. 26, 1946. Issued March 8, 1949.

A portable spot welding gun consists of a pair of terminal rods having welding electrodes which move toward and away from each other as pivotally connected rods are moved. An actuating mechanism including an elongated leaf spring causes the pivotal movement.

* * *



Electrode Die

2,467,636. BERNARD STOUDT, Valley Stream, N. Y., and ANTHONY GIORDANO, Brooklyn, N. Y. Assigned to Ames Spot Welder Co., Inc., Brooklyn, N. Y. Filed July 24, 1948. Issued April 19, 1949.

Patent pertains to an electrode die for making contact tips of resistance welders. The die comprises a body having a groove in one side and a yieldable mat-like piece of conducting material on the same side. Intermediate portion of the conducting material is deformed into a bulge projecting into the groove.

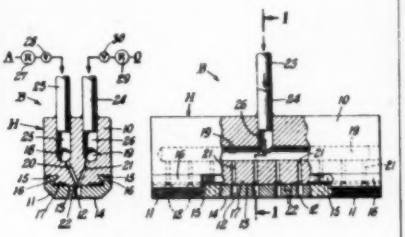
* * *

Welding Electrode

2,463,096. FRANCIS E. GARRIOTT, West Allis, Wis. Assigned to Ampco Metal, Inc., Milwaukee, Wis. Filed March 1, 1946. Issued March 1, 1949.

A bronze electrode for arc welding consists of a core rod and a covering for it. The covering comprises a mixture of fluoride slag-producing material, silicate binder, iron and potassium. The iron is in powder and iron oxide form, while the potassium is in feldspar and potassium silicate. From 5 to 50% by weight of the covering is iron.

* * *

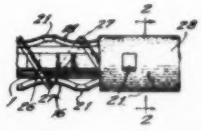


Blowpipe Design

2,456,784. HOMER W. JONES, Westfield, N. J. Assigned to Union Carbide and Carbon Corp. Filed March 9, 1944. Issued Dec. 21, 1948.

A nozzle in combination with a body produces a postmixed oxy-fuel gas flame. An inclined fuel-gas passage and an inclined oxygen passage converge at a common orifice in a surface of the body. Since the flame produced thereby is subject to a undesirable shape unsuitable for welding, means for improving the shape of the flame are provided. These means comprise a tip having a mixed gas passageway extending from the original surface to the outer surface of the tip. The cross-sectional area of the passageway is equal to both of the other passages. The length of passageway is of the order of twice its diameter.

* * *

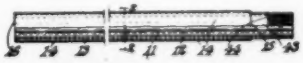


Coated Welding Wire

2,464,186. ALBERT M. ROSS, Westmont, Ill. Assigned one-half to William S. Gilpin, La Grange, Ill., and one-half to National Cylinder Gas Co., Chicago. Filed Nov. 15, 1945. Issued March 8, 1949.

Patent pertains to a welding wire which has an elongated core with an enveloping sheath of flux material. A strip extends longitudinally of the core and is imbedded in the flux sheathing. The strip is of tortuous form to extend about opposite sides of the core. A second strip also extends along the core on the outside of the first strip. Portions of the second strip are exposed at the surface of the flux.

* * *



Cutting Electrode

2,462,463. ROBERT HENRY FARMER BOOT, London, England. Assigned to Under Water Welders & Repairers, Ltd., London. Filed May 1, 1945. Issued Feb. 22, 1949.

An electrode for underwater cutting comprises a refractory main body of carbon and a metal case surrounding it. An insulating covering is around the metal. Carbon and casing form a passage for oxygen from end to end of the electrode.

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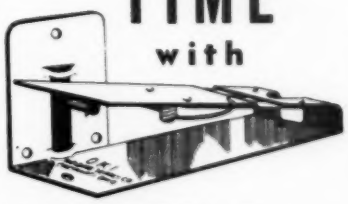

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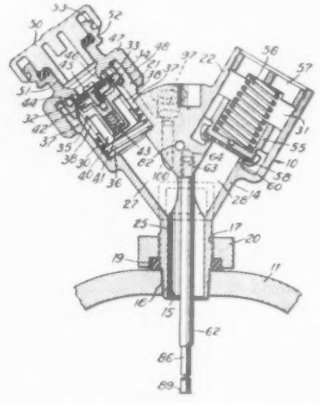
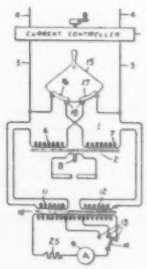
Gas Fitting

2,456,913. WILLIAM C. BUTTNER, Evanston, Ill., and SAVIN L. SUNDSTROM, Chicago. Assigned to The Bastian-Blessing Co., Chicago. Filed March 25, 1947. Issued Dec. 21, 1948.



For use in a fitting a new filler valve has a cylindrical passage with a shoulder at one end and an inwardly facing conical seat at the other. A valve fits on the conical seat. An annular groove opens into the valve at the end opposite the seat. Flutes on the sides of the valve support it in the passage. Radial holes connect each flute with the annular groove. A second valve seat coaxial with the conical seat and a second valve member are supported by the first member. Second valve is movable independently of the first for closing against the second seat.

* * *



Welding Transformer

2,464,061. WILLIAM A. SOLEY, JR., Melrose, Mass. Assigned to General Electric Co., Schenectady. Filed April 3, 1946. Issued March 8, 1949.

Patent covers a circuit containing a main transformer and a current transformer, both having multi-section primary windings and a secondary winding. A controller varies the input current of the main transformer between wide limits. An ammeter is connected to the secondary of the current transformer. Each section of the current transformer primary is connected in series with a different section of the main primary so as to constitute a number of groups of series-connected sections. Means are provided for selectively connecting the groups in parallel and in series.

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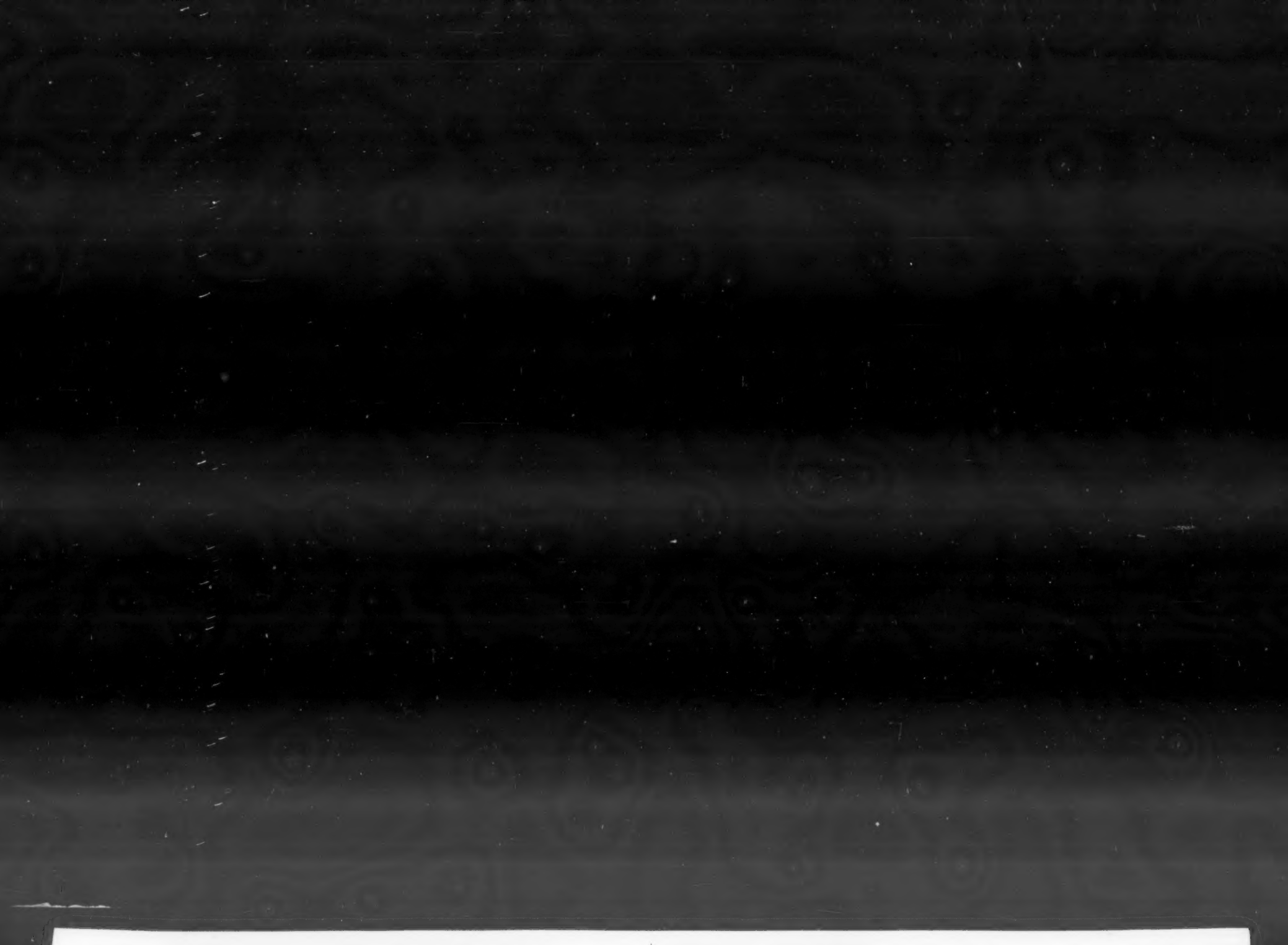
405 Penn Ave. Pittsburgh 22, Pa.